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Program Report

Corporate Finance

Raghuram G. Rajan*

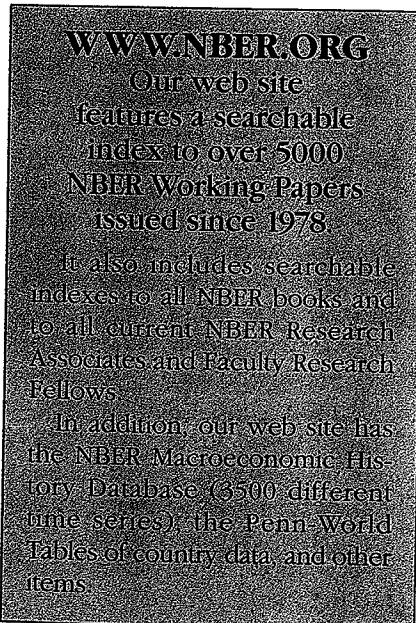
The NBER's Corporate Finance Program was established in 1991 with Robert W. Vishny as its first director; I became Program Director in 1998. Corporate finance, narrowly interpreted, is the study of the investment and financing policies of corporations. But since firms are at the center of economic activity—and since almost any topic economists are concerned with, from incentives and risksharing to currency crises, affect corporate financing and investment—it is increasingly hard to draw precise boundaries around the field. Reflecting this, Jeremy C. Stein and Luigi G. Zingales organized an NBER/Universities Research Conference in December 1999 on the "Macroeconomic Effects of Corporate Finance." In fact, I think some of the most interesting work in corporate finance is now being done at its interface with other areas. I describe some of that work in this report.

Law and Financial Development

It is fitting to start with Andrei Shleifer's recent path-breaking work on the links between law and finance, since he won the John Bates Clark Medal in 1999. In a series of papers, Rafael La Porta, Florencio Lopez-de-Silanes, Shleifer, and Vishny describe links between the origin of a country's legal system and the extent to which the system protects investors. They find, among other things, that countries with a legal code based on common law protect investors better than countries with a legal code based on civil law.¹

Legal systems also seem to directly affect the development of external capital markets. It turns out that stock markets and debt markets have developed less in countries with a French civil law origin than in countries with a common law origin.² Legal origin also appears to be related to corporate

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ownership, dividend policies, and valuations.³ This body of work has inspired a whole new literature on law and finance.

However, while specific laws may plausibly affect the nature of corporate ownership and finance, there is still no theory of why legal origin should affect finance, if in fact it does. Some economists, myself included, believe that other forces correlated with common law origins may be responsible for the relationships that La Porta, Lopez-de-Silanes, Shleifer, and Vishny find in the data. But debates of this kind are what make corporate finance such a fertile area of inquiry today.

Corporate Investment

While there has been much attention paid to corporate financing, we know very little about corporate investment, other than through acquisitions, largely because of the paucity of large sample data. We now have some data on the investment practices of diversified firms, and researchers have begun to test theories of the beneficial effects of these firms. Diversified firms create internal capital markets, which then finance good projects that the market ignores.⁴ However, the notion that diversified firms make efficient investments is not consistent with the growing evidence that they trade at a discount relative to focused firms. Recently, researchers have tried to link the discount that diversified firms trade at to distortions in the allocations of capital budgets among divisions.⁵ Others have attempted to show that some of the evidence of the diversification discount, or of the misallocation, may be spurious or overstated.⁶ Clearly, this debate will go on for some time.

Innovation

There has been increasing interest in the sources of innovation and the

financial structures that promote it. Samuel S. Kortum and Josh Lerner⁷ ask whether venture capital spurs innovation. In a study of 20 different industries over three decades, they find a positive association between the presence of venture capital and the rate of patenting. Of course, such a study raises issues of reverse causality: that is, it could be that industries that innovate a lot attract venture capital. They address this possibility.

In another study, Randall K. Morck, David A. Strangeland, and Bernard Yeung⁸ show that countries in which there is a lot of inherited wealth relative to GDP spend less on innovation. In particular, Canadian firms that are controlled by heirs tend to do less R and D than otherwise similar firms. The authors conclude that inherited corporate wealth impedes growth.

Banking

The recent financial crises in different countries have refocused attention on our understanding of banks. Bengt R. Holmstrom and Jean Tirole have developed a theory of financial intermediation and liquidity based on the collateral value of assets. They extend this approach to the determination of the liquidity premiums associated with different assets.⁹ This work is important in that it brings insights from corporate finance to the pricing of financial assets.

Douglas W. Diamond and I¹⁰ build a theory of banks that explains why financial fragility may be essential to the process of creating liquidity and credit. Our work attempts to explicitly model the links between the bank's asset side (illiquid loans) and its liability side (demandable deposits). Anil K. Kashyap, Stein, and I¹¹ did a similar study showing that there is a synergy between demand deposits and loan commitments. The implication is that banks can be

made perfectly safe only by destroying their very function.

Jun-Koo Kang and Rene M. Stulz¹² also address the critical role of banks in the economy. They show that, relative to independent firms, Japanese firms with links to banks lost more value and had to reduce investment by more than other firms when their banks experienced difficulty. These findings are not attributable to reverse causality (that is, that the banks experienced difficulty because their client firms were in trouble).

Takeo Hoshi and Kashyap¹³ provide a detailed analysis of the origins of the Japanese banking crisis and its likely consequences. Finally, Edward J. Kane¹⁴ portrays the banking crises that have roiled world markets in recent years as information-producing events that identify and discredit inefficient strategies for regulating banking markets.

According to theory, the importance of banks stems in large part from their ability to monitor and lend to firms the market will not touch. Randall S. Kroszner and Philip E. Strahan¹⁵ ask what leads bankers to become board members of firms; that is, does this indicate a monitoring role for the banks? They find that banks in the United States appear to fear involvement in management because of concerns about equitable subordination and lender liability. As a result, they tend to be represented primarily on the boards of large, stable firms with tangible assets and little reliance on short-term debt. Thus, at least in the United States, bankers are not represented on the boards of firms that require the most monitoring.

Theory of the Firm

Our members also have been trying to develop a better understanding of the boundaries of the corporation. Oliver D. Hart and John Moore¹⁶ model hierarchies based on the allocation of authority. Corporate

owners have the ultimate authority, but limited time to exercise it, so they delegate. Hart and Moore have some results already on the optimal degree of decentralization and the boundaries of the firm. But is the incomplete contract approach espoused by Hart and Moore legitimate? They respond to their critics by providing some conditions—primarily the inability to commit—under which the incomplete contract approach does hold.¹⁷

Krishna B. Kumar, Zingales, and I¹⁸ examine whether theories of the boundaries of the firm can explain firm size across both industries and countries. We find that industries that use a lot of physical capital have larger firms, as do countries with greater judicial efficiency. Industries that use a lot of capital are relatively smaller in countries with greater judicial efficiency; we argue that this is consistent with recent theories of the firm. ▶

Ownership Structures

Corporate ownership has always been an important subject of research for our group. Clifford G. Holderness, Kroszner, and Dennis P. Sheehan¹⁹ find that, contrary to prior research suggesting that managers have very little exposure to equity today as compared to the past, ownership by officers and directors of publicly traded firms on average is higher today than it was earlier in the century. Managerial ownership rises from 13 percent for the universe of exchange-listed corporations in 1935, the earliest year for which such data exist, to 21 percent in 1995. This work recently won the first Brattle Prize for the best paper on corporate finance published by the *Journal of Finance*.

Work by Shleifer²⁰ looks at the effects of state versus private ownership. He concludes that private ownership generally is preferable to

public ownership when the incentives to innovate and to contain costs must be strong. He argues that too many economists in the past focused on the role of prices under socialism and capitalism, ignoring the enormous importance of ownership as the source of capitalist incentives to innovate.

Our members also have done some work on business groups. Lucian A. Bebchuk, Reinier Kraakman, and George Triantis²¹ examine common arrangements for separating control from cash flow rights typically used in business groups: stock pyramids, cross-ownership structures, and dual class equity structures. They conclude that these have the potential to create very large agency costs. Tarun Khanna and Krishna Palepu²² examine business groups in India and conclude that they are difficult to monitor. Also, group affiliation tends to reduce foreign institutional investment, even though foreign institutional investors tend to be better monitors than domestic institutions.

Managerial Incentives

An extraordinary paper by Holmstrom on managerial incentives is now available in the NBER Working Paper series.²³ In some more recent work, George P. Baker and Brian J. Hall²⁴ suggest that there is confusion among academics and practitioners about how to measure the strength of CEO incentives and how to reconcile the enormous differences in pay sensitivities between executives in large and small firms. They show that while one measure of CEO incentives (the dollar change in CEO wealth per dollar change in firm value) falls by a factor of ten between firms in the smallest and largest deciles in their sample, another measure of CEO incentives (the value of CEO equity stakes) increases by roughly the same magnitude. Baker and Hall dis-

cuss the situations under which each measure is most applicable.

Data on managerial compensation also can be used to test theories of optimal contracting and compensation. Rajesh K. Aggarwal and Andrew A. Samwick²⁵ argue that executives who have more precise signals of their effort than firm performance will receive compensation that is less sensitive to the overall performance of the firm than other executives. Consistent with this, the authors find that CEOs' pay-performance incentives are higher by \$5.85 per \$1,000 increase in shareholder wealth than the pay-performance incentives of executives with only divisional responsibility.

Debt and Equity

We have fairly good models of outside debt, but no good theory of outside equity. Stewart C. Myers²⁶ explores the necessary conditions for outside equity financing when insiders—that is, managers or entrepreneurs—are self-interested and cash flows are not verifiable. He contrasts two control mechanisms: a partnership, in which outside investors can commit assets for a specified period; and a corporation, in which assets are committed for an indefinite period but insiders can be ejected at any time.

Finally, Roger H. Gordon and Young Lee²⁷ revisit the old but still controversial issue of whether taxes affect corporate debt policy. They find that taxes have had a strong and statistically significant effect on levels of debt. In particular, the difference in corporate tax rates currently faced by the largest versus the smallest firms (35 percent versus 15 percent) is predicted to induce larger firms to finance 8 percent more of their assets with debt than the smaller firms do.

Summary

It is not possible, given space limitations, to do justice to the range of

issues our members are working on. I hope this sampling gives you a taste for more. You can access the full array of NBER Working Papers by the Corporate Finance Program at our web site (www.nber.org).

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² R. La Porta, F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, "Legal Determinants of External Finance," NBER Working Paper No. 5879, January 1997.

³ R. La Porta, F. Lopez-de-Silanes, and A. Shleifer, "Corporate Ownership around the World," NBER Working Paper No. 6625, June 1998; R. La Porta, F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, "Agency Problems and Dividend Policies around the World," NBER Working Paper No. 6594, June 1998, and "Investor Protection and Corporate Valuation," NBER Working Paper No. 7403, October 1999.

⁴ See, for example, R. G. Hubbard and D. Palia, "A Re-Examination of the Conglomerate Merger Wave in the 1960s: An Internal Capital Markets View," NBER Working Paper No. 6539, April 1998.

⁵ D. S. Scharfstein and J. C. Stein, "The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment," NBER Working Paper No. 5969, March 1997; D. S. Scharfstein, "The Dark Side of Internal Capital Markets II: Evidence from Diversified Conglomerates," NBER Working Paper No. 6352, January 1998; R. G. Rajan, H. Servaes, and L. G. Zingales, "The Cost of Diversity: The Diversification Discount and Inefficient Investment," NBER Working Paper No. 6368, January 1998; F. P. Schlingemann, R. M. Stulz, and R. A. Walkling, "Corporate Focusing and Internal Capital Markets," NBER Working Paper No. 7175, June 1999.

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⁸ R. K. Morck, D. A. Strangeland, and B. Yeung, "Inherited Wealth, Corporate Control, and Economic Growth: The Canadian Disease," NBER Working Paper No. 6814, November 1998.

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25 R. S. Kroszner and P. E. Strahan, "Bankers on Boards: Monitoring, Conflicts of Interest, and Lender Liability," NBER Working Paper No. 7319, August 1999.

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Research Summaries

Economic Impacts of Environmental Policies

Lawrence H. Goulder*

Over the last three decades in the United States and other nations, there has been a significant increase in the use of economic analysis to guide the design and evaluation of environmental policies. Economic analysis has played a key role in the evaluation of "green tax reform"—the re-

orienting of the tax system to concentrate taxes more on "bads" like pollution and less on "goods" like labor effort or capital formation (saving and investment). Economic analysis also has guided the design of innovative new approaches to environmental regulation that hold the promise of achieving environmental goals at lower cost than is possible under conventional regulations. And, it has been used to map out how the impacts of environmental policies are distributed across industries and household groups—a

consideration that is highly relevant to the political feasibility of environmental initiatives.

Much of my research focuses on these sorts of environmental policy issues. I often use a general equilibrium framework, an approach that considers how environmental policies affect not only the targeted firms or industries but the rest of the economy as well. General equilibrium analysis yields dramatically different results from what one would obtain from partial equilibrium, or sector-specific, analyses. In realistic, "sec-

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ond-best" economies with pre-existing distortionary taxes, such as income and sales taxes, the differences are striking. In some cases, policies that appear to improve efficiency in a partial equilibrium analysis emerge as reducing efficiency when researchers account for second-best, general equilibrium interactions. Moreover, general equilibrium interactions sometimes alter the relative costs of different environmental policy options, overturning the conventional wisdom that regulatory approaches are the most cost effective.¹

Environmental Tax Reform and the "Double Dividend"

Green tax reform usually involves substituting environmentally motivated ("green") taxes for existing distortionary ones, for instance income and sales taxes. One highly debated green tax reform is the introduction of a revenue-neutral carbon tax: levying taxes on fossil fuels according to their carbon content and using the additional tax revenues to finance reductions in income tax rates. The carbon tax would also confront the prospect of global climate change by discouraging combustion of fossil fuels and the associated emissions of carbon dioxide (CO₂), a principal contributor to the greenhouse effect.

The possibility of using green tax revenues to finance cuts in marginal rates of existing distortionary taxes is also attractive in terms of efficiency. This has prompted speculation as to whether the revenue-neutral substitution of environmental taxes for other taxes might offer a "double dividend": not only improving the environment but also reducing the overall cost of the tax system.

If the second "dividend" obtains, then the gross costs (that is, the costs apart from environmental benefits) of the reform are zero or negative. Proponents of revenue-neutral green

tax reforms would welcome this result, since it implies that policymakers must only establish that there are positive *benefits* to the environment from the reforms in order to justify them on efficiency grounds. This is especially important in regards to the carbon tax, given the vast uncertainties about the magnitudes of the environmental benefits (the avoided damages from climate change) that this policy generates.

A FIRST GLIMPSE

Does the double dividend indeed arise? Using revenues from green taxes to finance cuts in distortionary taxes does avoid some of the distortions that these pre-existing taxes would generate otherwise. This implies an efficiency benefit, which is termed the "revenue-recycling effect." Because of the positive revenue-recycling effect, the costs of a green tax reform will be lower when the revenues from such a tax are used to finance cuts in distortionary taxes than when the revenues are returned to the economy in a lump-sum fashion—for example, through lump-sum transfers to households. However, this simply means that the costs of the former policy are lower than the costs of the latter policy; it does not mean that those costs are negative, which is the requirement for the second dividend to occur.

Are the costs of the green tax negative? Over the last decade, many researchers have addressed this question.² The simplest analytical models suggest that the answer is no.³ These models point out that green taxes usually are a relatively inefficient way to raise revenue: the economic cost of raising a dollar through green taxes tends to be higher than that of raising a dollar through ordinary income taxes. Intuitively, that is because green taxes have a much narrower base than income taxes. They focus on individual commodities (such as fossil fuels) or on emis-

sions from particular industries. As a result, they tend to imply larger "distortions"⁴ in markets for intermediate inputs, for consumer goods, and for labor and capital. Hence, swapping a green tax for part of the income tax augments the (nonenvironmental) distortions of the tax system, and there is an economic cost of this revenue-neutral tax reform.

A CLOSER LOOK

Separating out three components of the overall cost of a green tax reform makes it easier to understand the requirements for obtaining the second dividend. The first component is the "primary cost" of the environmental tax, that is the direct cost to the regulated sector associated with changes in production methods or installation of pollution-abatement equipment required to reduce pollution. The second component, which emerges in a general equilibrium analysis, is the revenue-recycling effect. As mentioned earlier, this component serves to lower the costs of the reform. The third component is an additional general equilibrium impact called the "tax-interaction effect," which can be explained as follows: to the extent that environmental taxes raise producers' costs, they imply higher prices of commodities. This effectively reduces the real returns to factors—a given nominal wage payment or given nominal distribution of profits has less purchasing power. When there are pre-existing taxes on these factors, the environmental tax functions like an increase in factor taxes, compounding the distortions in factor markets from prior taxes. This adverse impact on factor markets is the tax-interaction effect.

To get the double dividend, the (cost-reducing) revenue-recycling effect would have to outweigh both the primary cost and the (costly) tax-interaction effect. Under neutral conditions,⁵ theoretical models indicate

that the revenue-recycling effect is not strong enough to do this—the double dividend does not arise. Under these same circumstances, the revenue-recycling effect is weaker than the tax-interaction effect. Thus, the gross costs are not only positive but also turn out to be higher than they would be in a world without prior distortionary taxes, and thus without the revenue-recycling and tax-interaction effects. This reflects the fact that environmental taxes are implicit factor taxes that expand pre-existing distortions in factor markets.⁶

Still, there are some circumstances under which the double dividend can arise. Although the initial theoretical analyses tended to reject the double dividend, a second wave of models offered more scope for the double dividend by acknowledging additional potential channels for beneficial efficiency impacts from green taxes. One such channel is an improvement in the relative taxation of capital and labor. If, prior to introducing the environmental tax, capital is highly overtaxed (in efficiency terms) relative to labor, and if the revenue-neutral green tax reform shifts the burden of the overall tax system from capital to labor (a phenomenon that can be enhanced by using the green tax revenues exclusively to reduce capital income taxes), then the reform can improve (in efficiency terms) the relative taxation of these factors.⁷ If this beneficial impact is strong enough, it can overcome the inherent efficiency handicap that (narrow) environmental taxes have relative to income taxes as a source of revenue. Similarly, if the initial tax system is highly distorted in terms of consumer goods, and the green tax reform improves the system in that dimension, then the double dividend can occur after all.⁸

These examples illustrate a general principle. The double dividend arises if three conditions hold: 1) the initial

tax system is inefficient along some nonenvironmental dimension (that is, it fails to be second-best optimal even when environmental quality considerations are ignored); 2) the revenue-neutral environmental tax reduces this inefficiency, and; 3) the efficiency improvement along this dimension more than compensates for the inherent efficiency disadvantage of the environmental tax.

The presence or absence of the double dividend thus depends on the nature of the prior tax system and on how environmental tax revenues are recycled. Empirical conditions are important. This does not mean that the double dividend is as likely to occur as not, however. The narrow base of green taxes constitutes an inherent efficiency handicap. The impact of the green tax reform on pre-existing inefficiencies in the tax system could offset this handicap, but it also could add to it. Numerical general equilibrium models aim to realistically incorporate the pre-existing inefficiencies of the tax system and to gauge how green taxes alter these inefficiencies. Although results vary, the bulk of existing research tends to indicate that even when revenues are recycled in ways conducive to a double dividend, the beneficial efficiency impact is not large enough to overcome the inherent handicap, and the double dividend does not arise.⁹

The difficulty of establishing the double dividend certainly makes it harder to garner political support for green taxes. Still, it is important to recognize that the absence of the double dividend does not mean that green taxes are a bad idea. To the contrary, even if the second dividend fails to occur, which means that the costs are positive, green taxes may produce benefits to the environment that more than compensate for such costs. Indeed, most analyses indicate that appropriately scaled green taxes will do just that.¹⁰

Prior Taxes and the Choice of Instrument for Environmental Regulation

General equilibrium tax interactions are also relevant to the cost impacts of other environmental policy instruments.¹¹ For example, they fundamentally affect the costs of tradeable emissions permits, and they indicate that a great deal is at stake in choosing whether to freely allocate or auction these permits.

Research by Ian W. H. Parry, Roberton C. Williams III, and Dallas Burtraw shows that, like environmental taxes, systems of tradeable permits lead to higher production costs, higher commodity prices, and lower real factor returns. As a result, regulating pollution through tradeable permits generates a tax-interaction effect similar to that produced by environmental taxes. If these permits are auctioned, and the revenues are used to finance cuts in prior distortionary taxes, then the tax-interaction effect will be partly offset by the revenue-recycling effect. On the other hand, if the permits are given out for free, there can be no such offset.¹²

The presence or absence of this offset has dramatic implications for the economic costs of tradeable emissions permits. Parry, Burtraw, and I show that the costs of reducing sulfur dioxide emissions under Title IV of the 1990 Clean Air Act could have been reduced by about 25 percent if the tradeable permits had been auctioned (and revenues recycled) rather than given out for free.¹³ In some cases, whether the overall efficiency impact is positive or negative depends on the decision to freely allocate or auction the permits. In this connection, we also show that while reducing CO₂ emissions through auctioned permits improves efficiency (provided that the revenues are recycled), a system of freely provided CO₂ permits is likely to reduce effi-

ciency. Under plausible values for the environmental benefits per ton of CO₂ abatement, any level of emissions reduction yields environmental benefits that fall short of society's costs of abatement.¹⁴

General equilibrium, second-best considerations also fundamentally change one's assessment of the costs of a range of alternative instruments for environmental regulations. Parry, Williams, Burtraw, and I have analyzed the costs of emissions taxes, tradeable permits, mandated technologies, and performance standards, taking into account the general equilibrium cost effects of a second-best setting with prior distortionary taxes.¹⁵ We find that the costs of achieving given amounts of abatement are higher if there are distortionary taxes than in an economy with no such taxes. The extra cost reflects the tax-interaction effect, which increases as pre-existing tax rates rise. For plausible tax rates and parameter values, the cost increase is substantial (20 percent or more).

Moreover, pre-existing taxes differentially affect policy costs, altering the rankings of policies. The cost impact of pre-existing taxes is particularly large for (nonauctioned) emissions permits, potentially as much as several hundred percent. This has important policy implications. Economists have long argued that tradeable emissions permits and emissions taxes are more cost effective than performance standards, technology mandates, and other traditional forms of regulation.¹⁶ Our results suggest that in the context of NO_x regulation, tradeable emissions permits will not yield cost savings over performance standards or technology mandates unless the permits are auctioned and the revenues used to cut other taxes.

Distributional Considerations and the Costs of Making Environmental Regulations More Attractive

The political resistance to environmental regulations may depend as much on the *distribution* of regulatory costs as on their aggregate level. Potential distributional impacts partly explain why a number of cost-effective policies for reducing U.S. emissions of CO₂ have failed to get off the ground politically. In particular, a revenue-neutral carbon tax would impose significant cost burdens on major energy industries. These industries are highly mobilized politically and can generate stiff opposition to policies that reduce their profits significantly.

Some policies avoid placing such large burdens on the energy industries—for example, a system of tradeable permits in which some of the permits are given out free. This is less costly to the regulated firms because it does not charge firms for every unit of fossil fuel (or carbon) introduced to the economy. But, as suggested earlier, the free provision of permits can imply much higher economy-wide costs of achieving given reductions in fossil fuel supply. Thus, there is an apparent trade-off between promoting efficiency and avoiding "undesirable" impacts on key industries (and enhancing political feasibility).

How serious is this trade-off? In recent work,¹⁷ A. Lans Bovenberg and I examine several alternative U.S. policies for CO₂ abatement designed to avoid adverse impacts on profits and equity values of major energy industries. We find that these distributional constraints can be met with just a small sacrifice of efficiency. The key element here is that the potential government revenue from CO₂ abatement policies is very large relative to the potential losses in profit to the major energy industries.

By designing policies that enable firms to retain even a small fraction of the potential revenues, the government can protect firm profits.¹⁸ Government revenue has an efficiency value because it can be used to finance cuts in pre-existing distortionary taxes. Because these abatement policies forgo little of this potential revenue, they involve only a small sacrifice of efficiency. It is also possible to insulate profits of other downstream industries that might otherwise experience significant profit losses. The revenue sacrifice (and thus the relative loss of efficiency) remains fairly small, even when petroleum refiners and electric utilities are brought into the "insulation net."

General Equilibrium Considerations Are Important in Other Policy Domains

A recurring theme in this research is the importance of general equilibrium interactions in assessing the efficiency costs of environmental policies. Recognizing these interactions is crucial to understanding the costs of revenue-neutral tax reforms, calculating the overall efficiency impacts and cost rankings of a range of alternative policy instruments, and understanding the efficiency costs associated with compensation schemes intended to enhance political feasibility. In the United States, current environmental policy assessments usually disregard these general equilibrium issues, concentrating instead on firm-level costs or using only a partial equilibrium framework. However, there seems to be a gradual trend toward taking general equilibrium issues into account.

The significance of general equilibrium interactions is not confined to the domain of environmental economics. In public economics, these interactions are relevant to assess-

ments of the marginal excess burden (or deadweight loss) from taxes on commodities. Theorists have long recognized that tax interactions are relevant to the measurement of excess burden, but it has been difficult to ascertain the overall implication of these interactions. Faced with these difficulties, applied research has tended to assume that the net effect of these interactions is zero and to invoke, by default, the simple "excess burden triangle" to measure excess burden.

In a recent paper,¹⁹ Williams and I show that under neutral assumptions, tax interactions imply substantially higher excess burden than the simple excess-burden triangle would indicate. We derive a practical alternative formula that accounts for these interactions in approximating excess burden. In addition, we perform numerical simulations to illustrate the significance of tax interactions in this context. For realistic parameter values and a wide range of assumed rates for prior taxes, the usual formula captures less than half of the excess burden of taxes on commodities. In contrast, our alternative formula approximates excess burden quite closely.

The general equilibrium interactions I describe are relevant to the impacts of a wide range of government policies. To the extent that agricultural policies or international trade policies raise the costs of output and thereby reduce real factor returns, they exacerbate the distortions in factor markets from pre-existing taxes and imply higher social costs than would be indicated by partial equilibrium analyses. These issues deserve consideration in assessments of policy costs.

¹ A. L. Bovenberg and I offer a survey of the implications of general equilibrium interactions for environmental tax and regulatory policies in "Environmental Taxation and Regulation in a Second-

Best Setting," in *Handbook of Public Economics, Second Edition*, A. Auerbach and M. Feldstein, eds., forthcoming.

² I survey the issues in "Environmental Taxes and the 'Double Dividend': A Reader's Guide," *International Tax and Public Finance*, 2(2) (August 1995). More recent surveys include F. Bosello, C. Carraro, and M. Galeotti, "The Double Dividend Issue: Modeling Strategies and Empirical Findings," *FEEM Discussion Paper No. 81.98*, December 1998; and A. L. Bovenberg, "Environmental Taxation and the 'Double Dividend': An Updated Reader's Guide," *International Tax and Public Finance*, 6(3) (1999), pp. 421-43.

³ See, for example, A. L. Bovenberg and R. de Mooij, "Environmental Levies and Distortionary Taxation," *American Economic Review*, 94(4) (September 1994), pp. 1085-9; I. W. H. Parry, "Pollution Taxes and Revenue Recycling," *Journal of Environmental Economics and Management*, 29 (1995), pp. S64-S77; and A. L. Bovenberg and L. H. Goulder, "Costs of Environmentally Motivated Taxes in the Presence of Other Taxes: General Equilibrium Analyses," *National Tax Journal*, 50(1) (March 1997).

⁴ "Distortions" is in quotes to acknowledge the fact that, in keeping with the focus on the second dividend, the present discussion ignores the policy's impacts on environmental quality and associated implications for overall efficiency — that is, environment-related benefits net of the economic costs.

⁵ The key assumption is that the environmental tax falls on a good or activity that is "average" in terms of its substitutability with factors of production such as labor. For a discussion of this issue, see my survey with A. L. Bovenberg, "Environmental Taxation and Regulation in a Second-Best Setting."

⁶ Similar principles apply to the analysis of optimal environmental taxation in a second-best setting. Because the cost of a given environmental tax is greater in the presence of distortionary taxes, in the presence of such taxes the optimal environmental tax rate is lower as well. A. L. Bovenberg and I examine this issue in "Optimal Environmental Taxation in the Presence of Other Taxes," *American Economic Review*, 86(4), (September 1996).

⁷ A. L. Bovenberg and I examine this in detail in "Costs of Environmentally Motivated Taxes in the Presence of Other Taxes: General Equilibrium Analyses,"

National Tax Journal, 50(1) (March 1997).

⁸ See I. W. H. Parry and A. Bento, "Tax Deductions, Environmental Policy, and the 'Double Dividend' Hypothesis," *Journal of Environmental Economics and Management*, 39(1) (January 2000).

⁹ For an excellent review of results from numerical studies, see "The Double Dividend Issue: Modeling Strategies and Empirical Findings," op. cit. A small sampling of numerical general equilibrium studies in which "favorable" recycling fails to generate the double dividend includes A. L. Bovenberg and L. H. Goulder, "Costs of Environmentally Motivated Taxes in the Presence of Other Taxes: General Equilibrium Analyses," op. cit.; L. H. Goulder, "Effects of Carbon Taxes in an Economy with Prior Tax Distortions: An Intertemporal General Equilibrium Analysis," *Journal of Environmental Economics and Management*, (October 1995); and S. Proost and D. van Reegmorter, "The Double Dividend and the Role of Inequality Aversion and Macroeconomic Regimes," *International Tax and Public Finance*, 2(2) (August 1995). Favorable recycling yields the double dividend in D. Jorgenson and P. Wilcoxen, "Reducing U.S. Carbon Emissions: An Econometric General Equilibrium Assessment," in *Reducing Global Carbon Dioxide Emissions: Costs and Policy Options*, D. Gaskins and J. Weyant, eds. *Energy Modeling Forum*, Stanford University, 1996.

¹⁰ See, for example, "Environmental Policymaking in a Second-Best Setting," in *Economics of the Environment, Selected Readings*, R. N. Stavins, ed. New York: W. W. Norton, 1999; and L. H. Goulder, "Energy Taxes: Traditional Efficiency Effects and Environmental Implications," in *Tax Policy and the Economy* 8, J. M. Poterba, ed. Cambridge: MIT Press, 1992.

¹¹ I survey these issues in "Environmental Policymaking in a Second-Best Setting," op. cit.

¹² D. Fullerton and G. Metcalf reach similar conclusions, but they explain the results in terms of whether policy-generated rents are collected by the government or retained by private firms. See "Environmental Controls, Scarcity Rents, and Pre-Existing Distortions," *NBER Working Paper No. 6091*, July 1997.

¹³ L. H. Goulder, I. W. H. Parry, and D. Burtraw, "Revenue-Raising versus Other Approaches to Environmental Protection: The Critical Significance of Pre-Existing

Tax Distortions," RAND Journal of Economics, Winter 1997.

¹⁴ I. W. H. Parry, R. C. Williams III, and L. H. Goulder, "When Can CO₂ Abatement Policies Increase Welfare? The Fundamental Role of Pre-Existing Factor Market Distortions," Journal of Environmental Economics and Management, 37 (January 1999), pp. 52-84.

¹⁵ L. H. Goulder, I. W. H. Parry, R. C. Williams III, and D. Burtraw, "The Cost-Effectiveness of Alternative Instruments for Environmental Protection in a

Second-Best Setting," Journal of Public Economics, 72(3) (1999), pp. 329-360.

¹⁶ See, for example, M. Cropper and W. Oates, "Environmental Economics: A Survey," Journal of Economic Literature, 30 (1992), pp. 675-92.

¹⁷ A. L. Bovenberg and L. H. Goulder, "Neutralizing Adverse Industry Impacts of CO₂ Abatement Policies: What Does It Cost?" in *Distributional and Behavioral Effects of Environmental Policy: Evidence and Controversies*, C. Carraro and G. Metcalf, eds., forthcoming.

¹⁸ Specifically, under policies involving CO₂ emissions reductions of up to 30 percent, the government needs to freely offer (rather than auction) only a small fraction (less than 10 percent) of CO₂ emissions permits or, similarly, must exempt only a small share (less than 10 percent) of emissions from the base of a carbon tax, to protect the profits of domestic fossil fuel (coal, oil, and natural gas) firms.

¹⁹ L. H. Goulder and R. C. Williams III, "The Usual Excess Burden Approximation Usually Doesn't Come Close," NBER Working Paper No. 7034, March 1999.

International Taxation

James R. Hines Jr.*

The ability and evident willingness of taxpayers to relocate activity, to shift taxable income between jurisdictions, and to respond to incentives created by the interaction of domestic and foreign tax rules, mean that the tax policies of other countries obviously must be considered in the formulation of domestic policy. In the current environment, almost every U.S. tax provision influences foreign direct investment (FDI) or provides incentives for international tax avoidance.

Research in the field of public finance reflects a growing awareness of the importance of foreign tax policies; over the last ten years, there have been many new quantitative studies of the impact of taxation in open economies.¹ This research considers how tax policies affect three aspects of economic activity: FDI, international tax avoidance, and economic efficiency.

Foreign Direct Investment

Tax rate differences over time and between countries can be very large, thereby significantly affecting aftertax returns to FDI. By now there is ample evidence that countries with lower tax rates receive much more FDI than do countries with higher tax rates. And, for a given country, FDI is greater in years in which associated tax burdens are lighter.² To be sure, there are important complications to this otherwise very simple story. The ability of taxpayers to adjust the financing of FDI, and the repatriation of profits to home countries, also can affect the magnitude of FDI.³ Furthermore, one of the stumbling blocks confronting efforts to estimate the impact of taxes on FDI is the importance of other nontax considerations—such as market size and proximity, local factor prices, and local infrastructure—and the possibility that they are correlated with tax rates.

There have been several efforts to identify the impact of tax rates on FDI in a way that removes as much as possible of the effect of correlated omitted variables. The U.S. Tax Reform Act of 1986 (TRA) provides one such opportunity, since it was a major tax change with important international repercussions, and it af-

fected certain firms and industries differently than it did others. Firm- and industry-level evidence suggests that American companies concentrating in assets not favored by the TRA reacted by increasing their foreign investment after 1986; furthermore, foreign investors in the United States (for whom the TRA provisions had relatively smaller impact) may have concentrated in these more heavily taxed assets in the years after 1986.⁴

Mihir Desai and I evaluate the impact of the TRA by comparing its effect on FDI undertaken by joint ventures and FDI undertaken by majority-owned foreign affiliates.⁵ The TRA introduced an important distinction between income received from these two foreign sources by requiring Americans to calculate foreign tax credit limits separately for each joint venture. This change greatly reduced the attractiveness of joint ventures, particularly those in low-tax foreign countries. We find that American participation in international joint ventures fell sharply after 1986, while international joint venture activity by non-American firms rose. The drop in American joint ventures was most pronounced in low-tax countries, which is consistent with the incentives created by

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Ithe TRA. Furthermore, after 1986 American joint ventures used more debt and paid greater royalties to their American parents, reflecting their incentives to economize on dividend payments.

Other types of comparisons offer useful evidence of the effect of taxation on FDI. The distribution between U.S. states of investment from countries that grant foreign tax credits with investment from all other countries provides one such comparison. The ability to apply foreign tax credits against home-country tax liabilities reduces an investor's incentive to avoid high-tax foreign locations. I find that differences in state corporate tax rates of a single percent are associated with differences between the investment shares of foreign-tax-credit investors and the investment shares of all others of 9 to 11 percent. This suggests that state taxes significantly influence the pattern of FDI in the United States.⁶

Comparisons between American and foreign FDI in third countries offer a different type of powerful evidence of the impact of taxation. American and foreign tax systems differ in their treatment of foreign income, in particular because most high-income capital-exporting countries grant "tax sparing" for FDI in developing countries, while the United States does not. Tax sparing is the practice of adjusting home country taxation of foreign investment income to permit investors to receive the full benefits of any host country tax reductions. For example, Japanese firms investing in countries with whom Japan has tax sparing agreements are entitled to claim foreign tax credits for income taxes that they would have paid to foreign governments in the absence of tax holidays and other special abatements.

The evidence indicates that the ratio of Japanese FDI to American FDI in countries with whom Japan has tax sparing agreements is roughly

double what it is elsewhere. In addition, I find that Japanese firms are subject to 23 percent lower tax rates than are their American counterparts in countries with whom Japan has tax sparing agreements.⁷ Similar patterns appear when tax sparing agreements with the United Kingdom are used as instruments for Japanese tax sparing agreements. This evidence suggests that tax sparing influences the level and location of FDI, as well as the willingness of foreign governments to offer tax concessions.

By now there is extensive evidence that the volume and location of FDI is sensitive to its tax treatment. There is even in the literature something of a regularity among estimates: the implied tax elasticity of FDI is in the neighborhood of -0.6. This reveals an impact of taxation on FDI that is strong enough to appear clearly, despite the importance of many other variables that influence FDI. Furthermore, it suggests that international investors cannot use creative financing and other methods so effectively and costlessly that they avoid all taxes on their international income. Nor do governments imposing high tax rates fully compensate foreign investors in indirect ways by providing various forms of infrastructure.

Tax Avoidance

International investors often can reduce their tax liabilities through careful structuring and financing of their investments, use of transactions between related parties located in different countries, and decisions as to when to repatriate profits to parent firms in home countries. These practices often must be coordinated with FDI decisions, but together with FDI appear to be strongly influenced by tax rate differences.

Sophisticated international tax avoidance typically entails reallocating taxable income from countries with high tax rates to countries with low tax rates, and may include

changing the timing of income recognition for tax purposes. Many of these methods are quite legal and closely resemble those used by domestic taxpayers. One example is the financing of foreign affiliates, which clearly can affect ultimate tax liabilities. If an American firm finances its foreign subsidiary with equity, then its foreign profits are taxable in the host country, and no U.S. tax is due until profits are repatriated to the United States. The alternative of financing the foreign subsidiary with debt from the parent company would entail lower foreign tax liabilities (since interest payments are deductible) but higher domestic tax liabilities (since interest receipts represent taxable income). Hence, the choice between financing a foreign affiliate with debt or with equity should depend on the difference between home and foreign tax rates, an implication that is quite consistent with the behavior of American multinational firms. Glenn Hubbard and I find that American-owned foreign subsidiaries located in high-tax countries are more likely to pay interest to their American parent companies in 1984 than are subsidiaries in low-tax countries, while the opposite pattern holds for subsidiaries remitting dividends to their American parents.⁸

The TRA significantly changed the cost of capital for multinational firms with excess foreign tax credits by effectively limiting the deductibility of interest expenses incurred in the United States. Kenneth Froot and I find that after 1986 American firms with excess foreign tax credits and half of their assets abroad borrowed 5 percent less annually than did firms with deficit foreign tax credits (whose borrowing costs were not affected by the 1986 tax change).⁹ A similar provision of the 1986 Act limited the deductibility of R and D expenses incurred in the United States by multinational firms with significant foreign sales and excess foreign tax

credits. There, too, the evidence indicates that American firms that were affected by the tax change responded by reducing R and D activity in the United States and replacing it with R and D performed in foreign locations.¹⁰ The estimated unit elasticity of demand for R and D implies that a tax change that increases the cost of performing R and D in the United States by 5 percent thereby reduces the volume of R and D by roughly 5 percent.

Of course, there are other methods of reducing tax obligations in an international environment, and sophisticated taxpayers show themselves to be adept at using such methods. Multinational firms can and do adjust the timing of dividend repatriations from foreign subsidiaries to reduce the associated tax liabilities. Hubbard and I find that only 16 percent of the foreign subsidiaries of American multinational firms paid any dividends to their parent companies in 1984. Subsequent research reports similar findings for other years.¹¹ American firms incur tax penalties if they pay bribes to foreign government officials or if they participate in unsanctioned international boycotts; the cost of these penalties vary with foreign tax rates, and the evidence indicates that the extent of such behavior is sensitive to its tax cost.¹² Even a multinational firm's country of residence is potentially affected by that country's system of taxing foreign income. There is evidence that the nationality of what are now American firms ultimately may be determined by how the United States imposes its worldwide resident tax system.¹³

Tax systems often permit a certain leeway in selecting transfer prices for transactions between related parties located in countries with different tax rates. Taxpayers also typically have incentives to reduce prices charged by affiliates in high-tax countries for goods and services provided to affil-

iates in low-tax countries. The available evidence suggests that transfer pricing is sensitive to tax rate differences: reported pre-tax profit rates of foreign affiliates are inversely related to local tax rates;¹⁴ royalty payments by foreign affiliates to their American parent companies are positively related to local tax rates;¹⁵ American firms with tax haven affiliates tend to have lower U.S. tax liabilities;¹⁶ and the foreign affiliates of American multinational firms are more likely to run trade surpluses with related parties if they are located in low-tax countries.¹⁷ While it is hardly surprising that taxpayers take steps to reduce their tax liabilities, this evidence is very useful in establishing the revenue impact of such behavior and in suggesting ways in which tax avoidance affects other variables of interest, such as FDI. Far from removing incentives to locate FDI in low-tax countries, the ability to use sophisticated tax avoidance techniques probably enhances the attractiveness of low-tax locations for FDI, since FDI is necessary in order to report earning significant income in a location.¹⁸

Economic Efficiency

Given the potential impact of taxation on the volume and location of FDI, as well as on the other activities of multinational firms, it is clear that the foreign provisions of actual tax systems may be responsible for considerable deadweight loss—or, to put the same point differently, that more efficient alternatives may be available. Fundamental tax reform proposals often contain provisions concerning foreign income that would simplify and render more efficient the incentives facing American taxpayers, though this is not universally the case.¹⁹ In the category of somewhat more modest reforms, Alberto Giovannini and I consider the potential efficiency gains from implementing corporate taxation based on the

residence of shareholders rather than the source of income-generating activity within a community such as the European Union.²⁰ Yet another efficiency-enhancing alternative is for home countries to permit investors to receive deductions for capital outflows while fully taxing all capital inflows, a possibility that could be implemented even while imposing what is otherwise a traditional income tax.²¹

The current U.S. tax treatment of foreign income is often criticized by observers who feel that the combination of foreign tax credits and deferral encourages foreign investment by American companies at the expense of domestic investment. This criticism typically relies on a stylized conceptual framework in which a fixed supply of capital is allocated between countries based on tax considerations. A potentially important, though more subtle, variant of this argument notes that aspects of the tax system that encourage foreign investment may thereby reduce expected payoffs to bondholders in the event of default, making borrowing more expensive and indirectly discouraging domestic investment.²² In order to evaluate the overall impact of international taxation on the efficiency of resource allocation, however, it is necessary to consider its interaction with other distortionary aspects of the tax system. In such a setting, tax provisions that might otherwise reduce efficiency, such as the ability to defer home-country taxation of unrepatriated foreign profits, actually can enhance efficiency.²³

The interaction of taxation and inflation is responsible for a different kind of inefficiency. In an open economy with a nominal tax system, domestic inflation changes aftertax interest rates at home and abroad, thereby stimulating international capital movement and influencing domestic and foreign tax receipts, saving, and investment. Desai and I find

that the efficiency costs of inflation-induced international capital reallocations are typically much larger than those that accompany inflation in closed economies, even if capital is imperfectly mobile internationally.²⁴

There is extensive evidence of the responsiveness of behavior to international tax rate differences, and this evidence carries important implications for the efficiency of foreign and domestic tax systems. This evidence also enlightens what were once purely domestic issues concerning the determinants of investment, corporate finance, R and D activity, and a host of other economic decisions. The ability to look across countries and firms with widely differing tax situations opens promising new avenues of investigation that may offer useful answers to what continue to be important and open questions.

¹ For recent reviews of this literature, along with expanded analysis of many of the studies surveyed here, see J. R. Hines Jr., "Tax Policy and the Activities of Multinational Corporations," in *Fiscal Policy: Lessons from Economic Research*, A. J. Auerbach, ed. Cambridge: MIT Press, 1997, pp. 401-45; and J. R. Hines Jr., "Lessons from Behavioral Responses to International Taxation," *National Tax Journal*, 53 (2) (June 1999), pp. 305-22.

² For evidence that FDI is concentrated in countries with low tax rates, see H. Grubert and J. Mutti, "Taxes, Tariffs, and Transfer Pricing in Multinational Corporate Decisionmaking," *Review of Economics and Statistics*, 73 (2) (May 1991), pp. 285-93; J. R. Hines Jr. and E. M. Rice, "Fiscal Paradise: Foreign Tax Havens and American Business," *Quarterly Journal of Economics*, 109 (1) (February 1994), pp. 149-82; and R. Altshuler, H. Grubert, and T. S. Newlon, "Has U.S. Investment Abroad Become More Sensitive to Tax Rates?" *NBER Working Paper No. 6383*, January 1998, also in *International Taxation and Multinational Activity*, J. R. Hines Jr. ed. Chicago: University of Chicago Press, forthcoming. For evidence that FDI is concentrated in years with low tax rates, see D. G. Hartman, "Tax Policy and Foreign Direct Investment in the United States," *National Tax Journal*, 37 (4) (December

1984), pp. 475-87; M. Boskin and W. G. Gale, "New Results on the Effects of Tax Policy on the International Location of Investment," in *The Effects of Taxation on Capital Accumulation*, M. Feldstein, ed. Chicago: University of Chicago Press, 1987, pp. 201-19; and J. Slemrod, "Tax Effects on Foreign Direct Investment in the United States: Evidence from a Cross-country Comparison," in *Taxation in the Global Economy*, A. Razin and J. Slemrod, eds. Chicago: University of Chicago Press, 1990, pp. 79-117.

³ See, for example, the model presented in J. R. Hines Jr., "Credit and Deferral as International Investment Incentives," *Journal of Public Economics*, 55 (2) (October 1994), pp. 323-47.

⁴ For firm-level evidence, see D. G. Harris, "The Impact of U.S. Tax Law Revision on Multinational Corporations' Capital Location and Income-shifting Decisions," *Journal of Accounting Research*, 31 (Supplement) (1993), pp. 111-40. For industry-level evidence, see D. L. Swenson, "The Impact of U.S. Tax Reform on Foreign Direct Investment in the United States," *Journal of Public Economics*, 54 (2) (June 1994), pp. 243-66; and also A. J. Auerbach and K. Hassett, "Taxation and Foreign Direct Investment in the United States: A Reconsideration of the Evidence," in *Studies in International Taxation*, A. Giovannini, R. G. Hubbard, and J. Slemrod, eds. Chicago: University of Chicago Press, 1993, pp. 119-44.

⁵ See M. A. Desai and J. R. Hines Jr., "'Basket' Cases: Tax Incentives and International Joint Venture Participation by American Multinational Firms," *Journal of Public Economics*, 71 (3) (March 1999), pp. 379-402.

⁶ See J. R. Hines Jr., "Altered States: Taxes and the Location of Foreign Direct Investment in the United States," *American Economic Review*, 86 (5) (December 1996), pp. 1076-94.

⁷ See J. R. Hines Jr., "'Tax Sparing' and Direct Investment in Developing Countries," *NBER Working Paper No. 6728*, September 1998, also in *International Taxation and Multinational Activity*, J. R. Hines Jr. ed. Chicago: University of Chicago Press, forthcoming.

⁸ J. R. Hines Jr. and R. G. Hubbard, "Coming Home to America: Dividend Repatriations by U.S. Multinationals," in *Taxation in the Global Economy*, A. Razin and J. Slemrod, eds. Chicago: University of Chicago Press, 1990, pp. 161-200. This pattern appears not to

have changed significantly over time, according to evidence reported by H. Grubert, "Tax Planning by Companies and Tax Competition by Governments: Is There Evidence of Changes in Behavior?" in *International Taxation and Multinational Activity*, J. R. Hines Jr. ed. Chicago: University of Chicago Press, forthcoming. See also J. R. Hines Jr., "Credit and Deferral as International Investment Incentives," *Journal of Public Economics*, 55 (2) (October 1994), pp. 323-47; and H. Grubert, "Taxes and the Division of Foreign Operating Income Among Royalties, Interest, Dividends, and Retained Earnings," *Journal of Public Economics*, 68 (2) (May 1998), pp. 269-90.

⁹ See K. A. Froot and J. R. Hines Jr., "Interest Allocation Rules, Financing Patterns, and the Operations of U.S. Multinationals," in *The Effects of Taxation on Multinational Corporations*, M. Feldstein, J. R. Hines Jr., and R. G. Hubbard, eds. Chicago: University of Chicago Press, 1995, pp. 277-307.

¹⁰ See J. R. Hines Jr., "On the Sensitivity of R and D to Delicate Tax Changes: The Behavior of U.S. Multinationals in the 1980s," in *Studies in International Taxation*, A. Giovannini, R. G. Hubbard, and J. Slemrod, eds. Chicago: University of Chicago Press, 1993, pp. 149-87; J. R. Hines Jr., "No Place Like Home: Tax Incentives and the Location of R and D by American Multinationals," in *Tax Policy and the Economy*, 8, J. M. Poterba, ed. Cambridge: MIT Press, 1994, pp. 149-82; and J. R. Hines Jr., "International Taxation and Corporate R and D: Evidence and Implications," in *Borderline Case: International Tax Policy, Corporate R and D, and Investment*, J. M. Poterba, ed. Washington, DC: National Academy Press, 1997, pp. 39-52. Further evidence on the international sensitivity of R and D location to taxation is provided by J. R. Hines Jr., "Taxes, Technology Transfer, and the R and D Activities of Multinational Firms," in *The Effects of Taxation on Multinational Corporations*, M. Feldstein, J. R. Hines Jr., and R. G. Hubbard, eds. Chicago: University of Chicago Press, 1995, pp. 225-48; and J. R. Hines Jr. and A. B. Jaffe, "International Taxation and the Location of Inventive Activity," in *International Taxation and Multinational Activity*, J. R. Hines Jr., ed. Chicago: University of Chicago Press, forthcoming.

¹¹ See J. R. Hines Jr. and R. G. Hubbard, "Coming Home to America: Dividend Repatriations by U.S. Multinationals," in *Taxation in the Global Economy*,

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¹² See J. R. Hines Jr., "Forbidden Payment: Foreign Bribery and American Business after 1977," NBER Working Paper No. 5266, September 1995; and J. R. Hines Jr., "Taxed Avoidance: American Participation in Unsanctioned International Boycotts," NBER Working Paper No. 6116, July 1997.

¹³ See J. R. Hines Jr., "The Flight Paths of Migratory Corporations," Journal of Accounting, Auditing, and Finance, 6 (4) (Fall 1991), pp. 447-79; and J. H. Collins and D. A. Shackelford, "Corporate Domicile and Average Effective Tax Rates: The Cases of Canada, Japan, the United

Kingdom, and the United States," International Tax and Public Finance, 2 (1) (May 1995), pp. 55-83.

¹⁴ See J. R. Hines Jr. and E. M. Rice, "Fiscal Paradise: Foreign Tax Havens and American Business," Quarterly Journal of Economics, 109 (1) (February 1994), pp. 149-82; H. Grubert and J. Mutti, "Taxes, Tariffs, and Transfer Pricing in Multinational Corporate Decision-making," Review of Economics and Statistics, 73 (2) (May 1991), pp. 285-93; and J. H. Collins, D. Kemsley, and M. Lang, "Cross-jurisdictional Income Shifting and Earnings Valuation," Journal of Accounting Research, 36 (2) (Autumn 1998), pp. 209-29.

¹⁵ J. R. Hines Jr., "Taxes, Technology Transfer, and the R and D Activities of Multinational Firms," in The Effects of Taxation on Multinational Corporations, M. Feldstein, J. R. Hines Jr., and R. G. Hubbard, eds. Chicago: University of Chicago Press, 1995, pp. 225-48; and H. Grubert, "Taxes and the Division of Foreign Operating Income Among Royalties, Interest, Dividends, and Retained Earnings," Journal of Public Economics, 68 (2) (May 1998), pp. 269-90.

¹⁶ D. Harris, R. Morck, J. Slemrod, and B. Yeung, "Income Shifting in U.S. Multinational Corporations," in Studies in International Taxation, A. Giovannini, R. G. Hubbard, and J. Slemrod eds. Chicago: University of Chicago Press, 1993, pp. 277-302.

¹⁷ K. A. Clausing, "The Impact of Transfer Pricing on Intrafirm Trade," NBER Working Paper No. 6688, August 1998, also in International Taxation and Multinational Activity, J. R. Hines Jr., ed.

Chicago: University of Chicago Press, forthcoming.

¹⁸ See the model developed in J. R. Hines Jr. and E. M. Rice, "Fiscal Paradise: Foreign Tax Havens and American Business," Quarterly Journal of Economics, 109 (1) (February 1994), pp. 149-82.

¹⁹ See J. R. Hines Jr., "Fundamental Tax Reform in an International Setting," in Economics Effects of Fundamental Tax Reforms, H. J. Aaron and W. G. Gale, eds. Washington, DC: Brookings, 1996, pp. 465-502.

²⁰ A. Giovannini and J. R. Hines Jr., "Capital Flight and Tax Competition: Are There Viable Solutions to Both Problems?" in European Financial Integration, A. Giovannini and C. Mayer, eds. Cambridge: Cambridge University Press, 1991, pp. 172-210.

²¹ See J. R. Hines Jr., "Border Cash-flow Taxation," mimeo, University of Michigan, 1999.

²² See J. R. Hines Jr., "Investment Ramifications of Distortionary Tax Subsidies," NBER Working Paper No. 6615, June 1998.

²³ See J. R. Hines Jr., "The Case Against Deferral: A Deferential Reconsideration," National Tax Journal, 52 (3) (September 1999), pp. 385-404. In this connection, see also J. R. Hines Jr., "Dividends and Profits: Some Unsubtle Foreign Influences," Journal of Finance, 51 (2) (June 1996), pp. 661-89.

²⁴ M. A. Desai and J. R. Hines Jr., "Excess Capital Flows and the Burden of Inflation in Open Economies," in The Costs and Benefits of Price Stability, M. Feldstein, ed. Chicago: University of Chicago Press, 1999, pp. 235-68.



Local Corruption and the Global Economy

Shang-Jin Wei*

Corruption, like cockroaches, has co-existed with human society for a long time. Its role in economic development is controversial. According to Samuel P. Huntington, the distinguished Harvard political scientist, "[i]n terms of economic growth, the only thing worse than a society with a rigid, over-centralized, dishonest bureaucracy is one with a rigid, over-centralized and honest bureaucracy."¹ On the other hand, Lawrence Summers, the current Secretary of the U.S. Treasury and previously a Harvard economics professor and NBER Research Associate, said otherwise: "If you look under most banking crises, there's always a degree of fraud and abuse, and there's often a large amount of criminal activity. Corruption threatens growth and stability in many other ways as well: by discouraging business, undermining legal notions of property rights and perpetuating vested interests."²

In this report, I summarize some papers that explore different consequences of corruption, particularly its interaction with international investment and finance.³ The goal is to address a number of questions: Does corruption on balance add "grease" or "sand" to the wheels of commerce? How costly is corruption to international investors relative to the effect of a tax? And, does corruption increase the chance of a currency crisis?

Bribery in the Economies: Grease or Sand?

Mauro conducted the first empirical study of the relationship between corruption and economic growth.⁴ Within a standard growth regression, he embedded a subjective measure of corruption across countries devised by the "in-house experts" at Business International (a consulting firm) and found that countries perceived to be more corrupt tend to grow more slowly. A potential problem with studies based on cross-country regressions, though, is that many things in a country are correlated, so it may be difficult to disentangle the effects attributable solely to corruption. For example, corruption may be highly correlated with the poor quality of public servants, a factor that may retard growth whether corruption exists or not.

One way to get around this is to examine evidence at the firm level. In what we believe is the first study of this kind, Daniel Kaufmann and I⁵ use three worldwide firm surveys to examine the "efficient grease hypothesis"; namely, that firms that pay more bribes face less red tape and have better access to public funds and bank loans (hence reducing their cost of capital). In short, we examine the hypothesis that bribery "greases the wheels" of commerce. To guide our analysis, we first derive a simple model. As the literature suggests,⁶ the "bribery-as-grease" hypothesis depends on the assumption that red tape is set exogenously. In our model, we therefore let the bureaucrat who takes the bribes also set the red tape. We distinguish between nominal bureaucratic harassment (for example, statutory tax and tariff rates, or the waiting time for a permit without bribery) and effective harassment (for example, actual tax and tariff rates, or queuing time after the firm pays a bribe).

Furthermore, we assume that different firms have different outside options because of their individual characteristics. This implies that the maximum degree of harassment tolerated also would vary across firms. For example, foreign firms would tolerate less harassment than domestic ones because they could relocate more easily to a different country. Overall, U.S. firms may tolerate the least harassment because, up until very recently, the United States was the only major source country that fined and criminalized its firms for paying bribes to foreign officials.⁷ Finally, firms dependent on more specialized inputs from the host country (for example, oil or gold) are less able to resist bribery demands from corrupt officials.

Not surprisingly, in equilibrium the bureaucrat would impose just enough nominal harassment to obtain the maximum bribes without inducing the firm to leave the country. As a consequence, nominal harassment and bribes are correlated positively across firms. But this is not the end of the story. In our model, for firms with weak outside options (and hence more willing to tolerate higher bribe demands), nominal harassment can be sufficiently high that in equilibrium across firms, *effective* harassment and bribes are correlated positively. This is in strong contrast to the efficient grease hypothesis.

The firm-level evidence that we examine comes from three sources: the Global Competitiveness Report (GCR) survey in 1995 (for its 1996 Report) of 1,537 firms in 48 countries; the GCR survey in 1996 (for its 1997 Report) of 2,827 firms in 58 countries; and the World Bank survey in 1996—in preparation for its 1997 World Development Report (WDR)—of 3,866 firms in 73 countries. The GCR

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and the WDR surveys do not sample the same countries, so they complement each other. Because measures of firm-level bribes are inferred from the firms' qualitative rating of corruption in a country, it is useful to cross-validate using different surveys. We look at several proxies for effective bureaucratic harassment: extent of regulatory burden, extent of regulatory discretion, time spent by senior managers with government officials discussing changes and interpretations of laws and regulation, and cost of capital. We find that across firms, each of these measures of effective red tape is correlated positively with bribery.

Because measures of harassment and bribery are all based on subjective survey responses, the positive correlation could be attributable to response biases that are correlated positively across the survey questions. For example, assume that firms A and B face the same demand for bribery and the same degree of harassment. However, the manager in firm A likes to complain (in Yiddish, "kvetch") more about government action, and thus may report more bribery and more harassment. In this case, bribery and harassment appear positively correlated across firms in the survey answers even though in reality they shouldn't be. Our study develops a method to deal with what we label this "kvetch effect." We construct a measure of possible perception bias at the individual firm level based on the firm's rating of the provision of public goods and services that arguably are identical across firms (that is, a rating of overall infrastructure, power supply, and mail delivery). When such measures of perception bias are included in regressions of effective harassment on bribery, the co-efficients on bribery generally become smaller (suggesting the presence of the kvetch effect) but they remain positive and statistically significant.

These results are consistent with our simple model and not with the efficient grease hypothesis.

Using a unique survey of Uganda firms that includes direct information on the monetary value of bribes, Jakob Svensson⁸ has shown that bribery tends to rise with firms' profitability and to decline with reversibility of investment. His findings also are consistent with our model and our empirical findings. These results do not suggest that, in a generally corrupt environment, an individual firm necessarily can do better by paying fewer bribes. What they suggest is that measures that increase all firms' ability to resist bribe demands may not only reduce bribes but also reduce red tape. One example of such a measure is the recent OECD (Organization for Economic Cooperation and Development) Convention that criminalizes bribery in international transactions.

How Taxing Is Corruption on International Investors?

Intuitively, we think that corruption deters foreign investment. Using data on U.S. outward investment, James R. Hines, Jr.⁹ has found that U.S. direct investment in more corrupt countries grew more slowly than in other countries during 1977-82. He interpreted this as the effect of the U.S. Foreign Corrupt Practices Act (FCPA) of 1977.

However, it is possible that corruption deters investment from all source countries. Corruption is a symptom that the government is malfunctioning in many ways, which adds costs to foreign investment. Also, even if bribes are necessary, then U.S. "ingenuity" might allow firms to find substitutes for cash bribes. The Kaufmann-Wei model discussed earlier suggests that FCPA sometimes could help U.S. firms to face less red tape and bribe demands: U.S. firms credibly could say that they *cannot* pay bribes. (On the

other hand, the "speed money" exception in the FCPA for bureaucrats' "routine work" and the existence of substitutes for cash bribes might reduce U.S. firms' abilities to commit and hence raise the bribe demands that they face.) For all of these reasons, it is useful first to test if major source countries invest less in more corrupt countries, and then to examine whether U.S. firms behave differently from those of the other source countries.

It is also useful to find out the magnitude of the effect of corruption on foreign investment. Many developing countries eager to attract foreign direct investment (FDI) have placed an emphasis on cheap labor, tax incentives, and education. However, it is possible that severe local corruption may deter more FDI than what cheap labor or generous tax giveaways can bring in. Further, one useful ingredient in an effective anti-corruption reform is a public awareness campaign, for which one needs an idea of the size of investment lost to corruption.

Using data on a matrix of bilateral FDI from 14 source countries to 41 host countries, I estimate the magnitude of the negative effect of corruption relative to that of corporate income taxes.¹⁰ The corruption measures are based on perception indexes estimates by Business International, International Country Risk Group, and Transparency International. For example, on a one-to-ten scale, Mexico is perceived to be more corrupt than Singapore by between six and seven grades. I find that a worsening in the host government's corruption level from what prevails in Singapore to what prevails in Mexico has the same negative effect on inward FDI as raising the marginal tax rate by 42 percentage points. A different specification that includes zero bilateral FDI produces an even bigger estimated effect: a worsening in the host government's corruption

level by the same extent (that is, from the level of Singapore to that of Mexico) has the same negative effect on inward FDI as raising the marginal tax rate by 50 percentage points. A possible explanation for the difference in the estimates is that severe corruption is precisely the reason that small and faraway source countries don't bother to invest in these countries. In my sample, while the U.S. firms appear to be more averse to corrupt host countries than firms in the other major source countries, the difference is not statistically significant.¹¹

Is China Exceptional?

China appears to be a puzzle. On the one hand, there is rampant corruption there. On the other hand, foreign investors appear to rush into China. Newspapers and magazines use the phrase "China fever" to describe the FDI rush or call China "the world's biggest magnet for FDI." Is China truly an exception, so corruption becomes less of a deterrent there?

Of course China is a large country, with a vast supply of cheap labor, and has been growing faster than the world average. These are reasons that Chinese inward FDI should be large in absolute terms. Taking these factors into account, I find that as far as FDI from the major source countries is concerned, there is no support for the notion that China is a "superhost" of FDI or that corruption in China has a smaller negative effect on FDI than corruption in other countries. Indeed, there is some evidence that China may even be a substantial underachiever as a host country for FDI from these countries.¹²

Does Corruption Make a Country More Vulnerable to Currency Crises?

The recent currency crises in East Asia, Russia, and Latin America have stimulated research on their causes.

On the one hand, it is common to hear the assertion that so-called crony capitalism is partly responsible for the crises (though very little systematic evidence has been presented to substantiate this). On the other hand, many economists argue that shifts in the (fragile) self-fulfilling expectations by international creditors are the real reason for the crises. To these researchers, the composition of a country's capital inflows is a very important predictor of the propensity of a country running into a currency crisis. The two most important indicators of that composition are the share of FDI in the total inflow and the ratio of short-term credit to foreign exchange reserves.

Crony capitalism and self-fulfilling expectations typically are presented as *rival* explanations. My recent research suggests that there may be a natural link between the two that has not been explored fully.¹³ In particular, corruption may increase the likelihood that a country has a composition of capital flows (in particular, reduced inward FDI and increased borrowing from foreign banks) that makes it more vulnerable to shifts in international investors' sentiments and expectations. A quick look at selected countries suggests that this hypothesis is plausible. During the early 1990s, New Zealand and Singapore had low levels of corruption and also substantially more inward FDI than foreign bank borrowing. On the other hand, Uruguay and Thailand were highly corrupt and also had substantially less FDI than foreign bank borrowing. This is consistent with the hypothesis that corruption and the composition of capital flows are connected.

Is there logic behind the nexus between local corruption and the composition of capital inflows? Corruption is at least annoying to both international banks and direct investors. However, corruption may be particularly detrimental to FDI. Rela-

tive to international bank lending, direct investment involves a higher sunk cost *ex post* and more repeated interactions with host-country government officials. This *ex post* vulnerability makes international direct investors more averse to corruption. Furthermore, the current international financial architecture is such that international bank credits stand a far better chance to be bailed out than international direct investment. Both of these reasons would affect the composition of the capital inflows into a corrupt country away from FDI and towards bank credits, hence increasing the likelihood of a future currency crisis.

Is there systematic evidence for this hypothesis beyond these anecdotes? I collected data from the Bank for International Settlement and the OECD on bilateral bank loans and bilateral FDI during 1994–6 for all country pairs for which such data are available. Consistently across several different specifications and three different measures of local corruption, I find that more corrupt countries tend to have a lower ratio of FDI to bank credit (after I control for several characteristics of the source and host countries and the source-host pairs). One can find similar, albeit weaker, evidence from the balance of payments (BOP) data across countries (as opposed to the data on bilateral FDI and bank loans). The evidence from the BOP data is weaker because it has more noise and because some of the determinants of FDI and loans are bilateral in nature. To sum up, my empirical results are consistent with the hypothesis that corruption indeed raises the probability of a currency crisis by altering the composition of a country's capital inflows.

Conclusion

While the theories may be ambiguous, the empirical evidence seems one-sided: corruption deters invest-

ment and economic growth. Furthermore, the quantitative impact of corruption is far from trivial. Its negative effect on inward FDI, for example, can easily offset a generous tax give-away typical in developing countries. Finally, the evidence suggests that corruption also may raise the probability of a currency crisis by altering the composition of a country's capital inflows (and probably by worsening the balance sheets of domestic banks and firms) though the evidence on this awaits future research.

¹ S. P. Huntington, *Political Order in Changing Societies*, New Haven: Yale University Press, 1968, pp. 386.

² L. Summers, "Speech to the Summit of Eight," Denver, Colorado, June 10, 1997.

³ For broader surveys, see P. Bardhan, "Corruption and Development: A Review of Issues," *Journal of Economic Literature*, Vol. XXXV (September 1997), pp. 1320-46; and S. J. Wei, "Bribery in the Economies: Grease or Sand?" in *World Bank Research Observer*, forthcoming.

⁴ Mauro, *Quarterly Journal of Economics*, 1995.

⁵ D. Kaufmann and S. J. Wei, "Does 'Grease Money' Speed Up the Wheels of Commerce?" *NBER Working Paper* No. 7093, April 1999.

⁶ P. Bardhan, "Corruption and Development: A Review of Issues," *Journal of Economic Literature*, Vol. XXXV (September 1997), pp. 1320-46; A. Shleifer and R. W. Vishny, "Corruption," *Quarterly Journal of Economics*, 108 (August 1993), pp. 599-617.

⁷ This is a consequence of the U.S. Foreign Corrupt Practices Act (FCPA) of 1977. However, the FCPA allows firms to pay bribes to speed up the routine work that the host countries' bureaucrats would have done anyway. On February 1999, the OECD Convention on Combating Bribery in International Transactions formally took effect, which now criminalizes the firms from all OECD countries (and from nine other non-OECD signatories of the convention) for paying bribes to foreign government officials. As of the beginning of 2000, some signatory countries (for example, France and Italy) have not completed their domestic ratification process.

⁸ J. Svensson, "Who Must Pay Bribes and How Much?" *unpublished World Bank Working Paper*, 1999.

⁹ J. R. Hines, Jr., "Forbidden Payment: Foreign Bribery and American Business After 1977," *NBER Working Paper* No. 5266, September 1995.

¹⁰ S. J. Wei, "How Taxing Is Corruption on International Investors?" *NBER Working Paper* No. 6030, May 1997, and *Review of Economics and Statistics*, forthcoming. See also S. J. Wei, "Why Is Corruption So Much More Taxing Than Taxes? Arbitrariness Kills," *NBER Working Paper* No. 6255, November 1997.

¹¹ Using data from a survey of Uganda firms, R. Fisman and J. Svensson (1999) find that bribery reduces the growth rate of the firms by a three-to-one ratio versus the same amount of tax. This is a useful extension to S. J. Wei, "Why Is Corruption So Much More Taxing Than Taxes? Arbitrariness Kills," op.cit.

¹² S. J. Wei, "Foreign Direct Investment in China: Source and Consequences," in *Financial Deregulation and Integration in East Asia*, T. Ito and A. O. Krueger, eds. Chicago: University of Chicago Press, 1996; and "Can China and India Double Their Inward Foreign Direct Investment?" Harvard University and the World Bank.

¹³ S. J. Wei, "Corruption, Composition of Capital Flows, and Currency Crisis," forthcoming as an NBER Working Paper

NBER Profile: John H. Cochrane

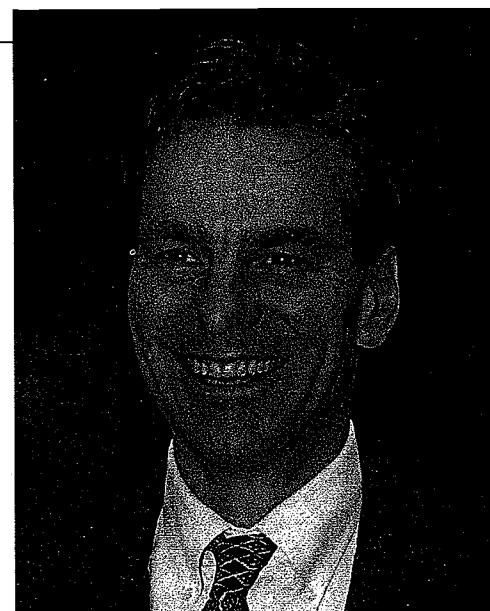
John H. Cochrane directs the NBER's Program on Asset Pricing and is the Sigmund E. Edelstone Professor of Finance and Economics at the University of Chicago. He began his affiliation with the NBER in 1988 as a Faculty Research Fellow, was promoted to Research Associate in the Asset Pricing and Economic Fluctuations and Growth Programs in 1994, and became Director of the Asset Pricing Program in 1999.

Cochrane received an S.B. in physics from MIT in 1979 and a Ph.D. in economics from the University of California, Berkeley in 1986. He joined the University of Chicago's economics department in 1985 as an assistant professor, was promoted to associate professor in 1990, and became a professor in the

University's Graduate School of Business in 1994. He received his named professorship in 1997.

In addition to his teaching and research, Cochrane is Editor of the *Journal of Political Economy* and a consultant to the research department of the Federal Reserve Bank of Chicago. Cochrane's research is split between macroeconomics and asset pricing. Most recently, he has been working on the fiscal theory of the price level, option pricing with imperfect replication, habit persistence and the predictability of returns, and a Ph.D. textbook.

Cochrane lives in the Hyde Park neighborhood near the University of Chicago with his wife, Elizabeth Fama, and children Sally, Eric, Gene, and Lydia. In rare spare time, he flies



sailplanes competitively and windsurfs in the frigid waters of Lake Michigan.

NBER Profile: *Lawrence H. Goulder*



Lawrence H. Goulder is a Research Associate in the NBER's Program in Public Economics. He is also an Associate Professor of Economics at Stanford University, a Senior Fellow of Stanford's Institute for International Studies, and a University Fellow of Resources for the Future, a nonprofit environmental and natural resource research firm located in Washington, D.C.

Goulder graduated from Harvard College with an A.B. in philosophy in 1973. He earned an M.A. in musical composition from the École Normale de Musique de Paris in 1975 and a Ph.D. in economics from Stanford in 1982. He was a faculty member in the economics depart-

ment at Harvard University before returning to Stanford in 1989.

Goulder has served as a consultant to the U.S. Environmental Protection Agency, the Organization for Economic Cooperation and Development, and the Environmental Defense Fund. His work, particularly in environmental economics, has been published in the leading economic journals.

Goulder lives in Menlo Park, California, with his wife Angela and daughters Maggie, 8, and Elizabeth, 3. He spends much of his free time with his family and especially enjoys family hiking and camping adventures. He also enjoys swimming, playing the piano, and writing music.

NBER Profile: *Shang-Jin Wei*

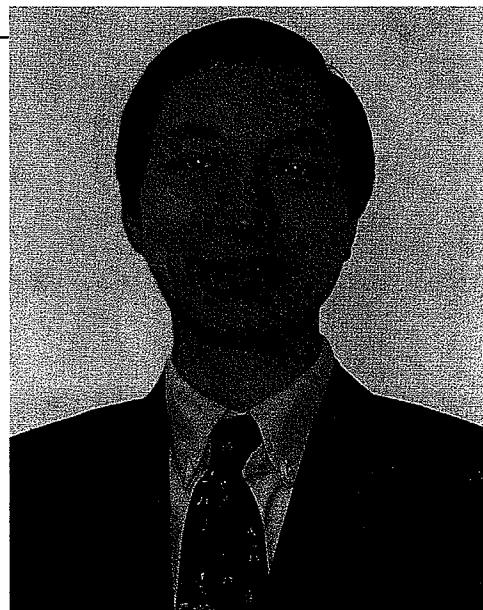
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Wei has been a visiting scholar at the International Monetary Fund, the World Bank, the Federal Reserve Bank of San Francisco, the Federal Reserve Board of Governors, the Asian Development Bank, and the Organization for Economic Cooperation and Development. His research interests include trade, finance, and the political economy aspects of international integration.

Outside research, Wei's interests include foreign movies, foreign countries, cycling, chocolate, and their convex combinations.



Conferences

Franco-American Seminar on Economics

The 12th NBER Franco-American Seminar on Economics was held in Toulouse, France, on October 21–23, 1999. It took place in conjunction with the 1st CEPR (Centre for Economic Policy Research) Workshop on Applied Industrial Organization. The conference on "The Econometrics of Price and Product Competition" was organized by Marc Ivaldi at the Institut D'Economie Industrielle, Université des Sciences Sociales de Toulouse (IDEI and EHESS, Toulouse); Ariel Pakes, NBER and Harvard University; and Lars-Hendrik Röller, CEPR and WZB, Berlin.

This joint conference was aimed at presenting the state of the art in applied industrial organization and at analyzing the issues of price and product competition through a structural approach. Eighteen papers were presented in six sessions. As can be seen from the program (below), the different contributions covered a large spectrum of questions, interests, and industries including, for instance, quality, location, entry, auctions, discrimination, and industry structure in the context of many different industries or products: cable TV, automobiles, books, motels, gasoline, supermarkets, fast foods, drugs, highway construction, and loans. The papers presented indicate that the econometrics of price and product competition provides operational tools, in particular for competition policy.

The program was:

Imperfect Competition

Chair: Ariel Pakes

Michael J. Mazzeo, Northwestern University, "Competitive Outcomes in Product-Differentiated Oligopoly" Discussant: Steven T. Berry, NBER and Yale University

Margaret E. Slade and **Joris Pinkse**, University of British Columbia, and **Craig Brett**, University of Essex, "Spatial Price Competition: A Semiparametric Approach" Discussant: Otto Toivanen, Helsinki School of Economics

Product Differentiation

Chair: Pedro Pita Barros, Universidade Nova de Lisboa
Amil Petrin, University of Chicago, "Quantifying the Benefits of New Products: the Case of the Minivan" Discussant: Joan-Ramon Borrell, Universitat de Barcelona

Sofronis K. Clerides, University of Cyprus, "Product Selection as Price Discrimination in the Market for Books" Discussant: Jordi Jaumandreu, Fundacion Empresa Publica, Madrid
Howard Smith, University of Oxford, "Supermarket Choice and Supermarket Competition in Market Equilibrium" Discussant: Pedro L. Marin, Universidad Carlos III de Madrid

Entry and Sunk Costs

Chair: Lars-Hendrik Röller
Michael Waterson, University of Warwick, and **Otto Toivanen**, "Market Structure and Entry: Where's the Beef?" Discussant: Frank Verboven, University of Antwerp, Tilburg University, and CEPR

Sara Fisher- Ellison, MIT, and **Glenn Ellison**, NBER and MIT, "Strategic Entry Deterrence and the Behavior of Pharmaceutical Incumbents Prior to Patent Expiration" Discussant: Marcus Asplund, Stockholm School of Economics

Applications of Auction Models

Chair: Jean Tirole, IDEI and CERAS, Paris

Luke M. Froeb, **Steven Tschantz**, and **Philip Crooke**, Vanderbilt University, "Second-price Auctions with Power Related Distributions: Predicting Merger Effects" Discussant: Gautam Gowrisankaran, University of Minnesota

Martin Pesendorfer, NBER and Yale University, and **Mireia Jofre-Bonet**, Yale University, "Bidding Behavior in a Repeated Procurement Auction" Discussant: Frode Steen, Norwegian School of Economics

Harry J. Paarsch, University of Iowa, **Stephen G. Donald**, Boston University, and **Jacques Robert**, University of Montreal, "Identification, Estimation, and Testing in Empirical Models of Sequential, Ascending-Price Auctions with Multi-Unit Demand: An Application to Siberian Timber-Export Permits" Discussant: Pascal Lavergne, INRA, Toulouse

Price Discrimination

Chair: Anne Perrot, University-Paris1 and CREST-INSEE

Gregory S. Crawford, Duke University, and **M. Coppejans**, "Bundling in Cable Television: Incentives and Implications for Regulatory Policy" Discussant: Phillip Leslie, University of California, Los Angeles

Robert J. Gary-Bobo and **Sophie Larribeau**, University of Cergy-Pontoise, "A Structural Model of Discrimination in Mortgage Lending, with some Evidence on Neutral Ground" Discussant: Moshe Kim, University of Haifa

Differentiation and Public Policy

Chair: Jacques Mairesse, NBER and CREST-INSEE, Paris

Neil Gandal and **Chaim Fershtman**, Tel Aviv University, and **Sarit Markovich**, University of Chicago, "Estimating the Effect of Tax Reform in Differentiated Product Oligopolistic Markets"

Discussant: Jérôme Foncel,
University of Lille

George Symeonidis, University of Essex and CEPR, "Are Cartel Laws Bad for Business? Evidence from the UK"

Discussant: Ralph Siebert, WZB, Berlin

Jeffrey R. Campbell, NBER and University of Chicago, and **Hugo**

A. Hopenhayn, University of Rochester, "Market Size Matters"
Discussant: James Levinsohn, University of Michigan

These papers can be found at www.nber.org/Franco_American.

Monetary Policy in a Low Inflation Environment

The NBER, London's Centre for Economic Policy Research (CEPR), and the Tokyo Center for Economic Research (TCEP) jointly sponsored a conference on "Monetary Policy in a Low Inflation Environment" in Tokyo on December 16 and 17. **Takao Hoshi**, TCEP and University of California, San Diego, and **Sadao Nishizaki**, TCEP and Hitotsubashi University, organized this program.

Kenji Nishizaki, Bank of Japan and **Tsutomu Watanabe**, Hitotsubashi University, "Output Inflation Tradeoff at Near-Zero Inflation Rates"

Discussants: **Kenichi Ohno**, Asia Development Bank Institute, and **Eric Rosengren**, Federal Reserve Bank of Boston.

Athanassios Orphanides and **Volker Wieland**, Federal Reserve Board of Governors, "Efficient Monetary Policy Design at Near-Price Stability"

Discussants: **Fumio Hayashi**, NBER and University of Tokyo, and **Kiyohiko G. Nishimura**, University of Tokyo

Harald Uhlig, CEPR and Tilburg University, "Should We Be Afraid of Friedman's Rule?"

Discussants: **Kyoji Fukao**, Hitotsubashi University, and **Nobutomo Kiyotaki**, London School of Economics. **Richard H. Clarida**, NBER and Columbia University, "G-5 Exchange Rate Relationships: A Recap of the Record and a Review of Proposals for Change" (NBER Working Paper No. 7349)

Discussants: **Hirotoshi Fukui**, Bank of Japan, and **Nikolaos Panigiotoglou**, Bank of England.

Ryuzo Miyao, Kobe University, "The Role of Monetary Policy in Japan: A Break in the 1990s?"

Discussants: **Takao Hoshi** and **Michael Hutchinson**, University of California, Santa Cruz.

Kazuo Ogawa, Osaka University, "Monetary Policy, Credit and Real Activity: Evidence from the Balance Sheet of Japanese Firms"

Discussants: **Joe Peck**, Federal Reserve Bank of Boston, and **Shigenori Shiratsuka**, Bank of Japan

Paul Krugman, NBER and MIT, "Three Views on Inequality, Trade, and Policy Implications"

Discussants: **Yosuke Takechi**, Sophia University, and **Eriko Yoshikawa**, TCEP and University of Tokyo

Motoshige Itoh and **Naoki Shimizu**, University of Tokyo, "On the Role of Monetary Policy in a Deflationary Economy"

Discussants: **John Driffill**, University of Tokyo, and **Mitsumasa Fukao**, Keio University

Japanese consumer price index (CPI) inflation rates have been declining since the first quarter of 1991. Ranging only between zero and 1 percent in 1996 and 1997, the CPI inflation rates have been negative since the third quarter of 1998. Using Japanese data, **Nishizaki** and **Watanabe** provide new evidence about

the cost of near-zero inflation. In particular, they are interested in the relationship between the rate of inflation and the slackness of the economy, that is, the short-run Phillips curve. The authors construct a panel dataset consisting of the rate of inflation and the ratio of job offers to applicants in 46 prefectures from 1971 to 1997.

After eliminating the effects of nationwide shocks, including changes in expectations about the future course of monetary policy, they find that the slope of the short-run Phillips curve does become smaller as the rate of inflation approaches zero. In particular, the estimated slope is smaller in the 1990s than it

was before that time.

Orphanides and **Wieland** study the design of monetary policy in a low inflation environment, taking into account the limitations imposed by the zero bound on nominal interest rates. They focus on the portfolio balance channel through which changes in relative money supplies influence the exchange rate. They find that the optimal policy near price stability (close to zero inflation) is asymmetric: that is, as inflation declines, the policy turns expansionary more quickly and aggressively than would be optimal if there were no zero bound on nominal rates. As a result, the average level of inflation is biased upwards. Thus, policymakers are faced with a tradeoff between the level of inflation and economic stabilization when the economy is operating near the zero bound. The authors also discuss some operational issues associated with the interpretation and implementation of policy at the zero bound in relation to Japan's recent situation.

Uhlig attempts to gain more insight into liquidity traps, Friedman's rule, and runaway deflation. He first finds that Friedman's rule can be implemented by shrinking the money stock at the appropriate rate over the long run. Therefore, increases in the money stock—be they through outright "helicopter drops," through any type of open market operation, or through foreign exchange intervention—change nothing as long as the economy remains in the equilibrium of a long-run shrinkage of the money stock. Next, Uhlig examines two simple reduced form models of the inflationary process, one inherently unstable and the other inherently stable. Neither model yields plausible results. Finally, Uhlig considers a formal "baby-sitting coop" model, taking up a line of argument promoted by Krugman (1999). This model yields multiple equilibria but can make

matters worse in terms of liquidity. Thus, Uhlig challenges the conventional wisdom: that liquidity traps are bad.

Clarida reviews G3 exchange rate relationships since the collapse of Bretton Woods and analyzes recent proposals for changing the way the G3 countries conduct exchange rate policy. Advocates of these proposals have assessed the global costs of exchange rate volatility and exchange rate misalignments, and find the status quo unacceptable. They believe that a sustained effort to limit G3 exchange rate fluctuations would deliver benefits to the world economy that would outweigh the value of any lost monetary autonomy in the G3 required to maintain such a system. The skeptics make a positive, not a normative, judgment that the sorts of proposals that are on the table will not circumvent the "impossible trinity" of international finance.

Miyao documents time-series evidence suggesting the case for a possible structural break in the role of Japan's monetary policy during the 1990s. While he detects a persistent effect of monetary policy on real output both between 1975 and 1998 and during the period ending in 1993, that effect disappears in the most recent subsample of the 1990s. There is also more specific evidence of a break in the reduced form dynamic system in 1995. Miyao offers some interpretations that intuitively support this empirical evidence.

Ogawa analyzes the mechanism of monetary transmission in the Japanese economy. Using quarterly time-series data disaggregated by firm size, he examines the channels through which monetary policy influences the important items on the firms' balance sheets: land stock, long-term loans, and capital stock. His evidence supports the credit channel of monetary transmission. He also finds that land has played a vital role in monetary

transmission, especially for small firms. Moreover, Ogawa shows that the large number of bad loans caused by excessive lending secured by land constrains the lending behavior of commercial banks and weakens the efficacy of monetary policy.

Krugman shows that the liquidity trap is not an artifact of the IS-LM model's incompleteness: even in a "modern" macroeconomic model based on intertemporal utility maximization by a representative agent, the liquidity trap can arise. Krugman argues that fiscal expansion or unconventional monetary policy would be sufficient to overcome the liquidity trap if it is only temporary. But if the liquidity trap is structural, as he believes to be the case for Japan, then inflation targeting aimed at changing expectations may be the only effective policy.

Like Krugman, **Itoh** and **Shimoi** suggest that Japan is in a liquidity trap. They describe "adjustment inflation policy" (*chosei inflation*), which was advocated in Japan during the early 1980s, and show that generating inflation or inflationary expectations is helpful not only in the context of Krugman's argument but also in reducing debt burdens in the private and public sectors. To create inflation or inflationary expectations with a liquidity trap, the Bank of Japan could pursue unconventional monetary policy, for example buying long-term government bonds or targeting the inflation rate to be higher than actual inflation.

These papers will be published in a special issue of the *Journal of the Japanese and International Economics*. Takeo Hoshi and Sadao Nagaoka will be guest editors of the issue. In advance of the publication of the journal, most of these papers will be available at "Books in Progress" on the NBER's web site, www.nber.org.

Prudential Supervision

An NBER Conference on "Prudential Supervision: What Works and What Doesn't," organized by NBER Research Associate **Frederic S. Mishkin** of Columbia University, took place on January 10–11. The program was:

James R. Barth, **Albion** University, **Gerard Caprio, Jr.**, **World Bank**, and **Ross N. Levine**, **University of Minnesota**, "Banking Systems Around the Globe: Do Regulation and Ownership Affect Performance and Stability?"

Discussant: **Mark Gertler**, NBER and New York University.

Allen N. Berger, **Federal Reserve Board of Governors**, **Margaret K. Kyle**, **MIT**, and **Joseph M. Scalise**, **Bain & Company**, "Did U.S. Bank Supervisors Get Tougher During the Credit Crunch? Did They Get Easier During the Banking Boom?"

"Did It Matter to Bank Lending?"

Discussant: **Stephen G. Cecchetti**, NBER and Ohio State University.

Randall S. Kroszner, NBER and University of Chicago, and **Philip E. Strahan**, **Federal Reserve Bank of New York**, "Obstacles to Optimal Policy: The Interplay of Politics and Economics in Shaping Banking Supervision and Regulation Reforms." Discussant: **Jeremy C. Stein**, NBER and MIT.

Mark Carey, **Federal Reserve Board of Governors**, "Dimensions of Credit Risk and Their Relationship to Economic Capital Requirements."

Discussant: **Patricia Jackson**, **Bank of England**.

Robert R. Bliss, **Federal Reserve Bank of Chicago**, and **Mark J. Flannery**, **University of Florida**, "Market Discipline in Governance"

of U.S. Bank Holding Companies

"Monitoring versus Influencing?"

Discussant: **Richard G. Ryan**, NBER and University of Chicago.

Charles W. Calomiris, NBER and Columbia University, and **Andrew Powell**, **Central Bank of Argentina**, "Can Emerging Market Banks Regulators Establish Credible Discipline? The Case of Argentina, 1992–9?"

Discussant: **Douglas W. Diamond**, University of Chicago.

Joe Rock, **Eric S. Rosengren**, and **Geoffrey M. B. Tootell**, **Federal Reserve Bank of Boston**, "Synergies Between Bank Supervision and Monetary Policy: Implications for the Design of Bank Regulatory Structure."

Discussant: **Ben S. Bernanke**, NBER and Princeton University.

Barth, Caprio, and Levine collect cross-country data on commercial bank regulation and ownership in more than 60 countries and evaluate the links between their different regulatory/ownership practices and financial sector performance and banking system stability. They find substantial variation across countries in three areas: regulatory restrictions on the ability of commercial banks to engage in securities, insurance, and real estate activities; the mixing of banking and commerce, both in terms of regulations on commercial banks owning nonfinancial firms and vice versa; and the degree of state ownership of commercial banks. Overall, they find that imposing regulatory restrictions has negative implications for the performance of commercial banks. Specifically, regulations that restrict the ability of banks to engage in securities activi-

ties and own nonfinancial firms are closely associated with greater instability in the banking sector. They find no countervailing positive benefits from restricting the mixing of banking and commerce or from restricting the activities of banks in the areas of investment banking, insurance, and real estate.

Berger, Kyle, and Scalise investigate the possibility that overall changes in supervisory "toughness" may significantly affect bank lending behavior and may potentially affect macroeconomic or regional economic health. They use information on the supervisory process, confidential data from bank examinations, and bank balance sheet and income data for 1986–98. They find that any increase in supervisory toughness during the credit crunch period (1989–92) likely had only a small effect on bank lending behavior, but decreases in supervi-

sory toughness during the boom period (1993–8) may have increased bank lending significantly.

Kroszner and **Strahan** provide a positive political economy analysis of the most important revision of the U.S. supervision and regulation system during the last two decades, the 1991 *Federal Deposit Insurance Corporation Improvement Act* (FDICIA). They analyze the impact of private interest groups and political-institutional factors on the voting patterns on amendments to FDICIA and its final passage in order to determine the importance of different types of obstacles to welfare-enhancing reforms. They find that both private interest group and political-institutional factors play significant roles; a "divide and conquer" strategy appears to be effective in bringing about legislative change.

A major revision of international

bank capital regulations now being proposed would embody recent advances in credit risk measurement and management. Previous regulations have been simpler, primarily aimed at getting capital requirements right on average, and thus largely ignoring the difference between average and marginal. **Carey** presents evidence showing the importance of the new regulations' explicit treatment of several important dimensions of credit risk. If such dimensions are compressed or ignored, capital arbitrage activities by banks are likely to continue, leading to an increase in bank failure rates over time.

Bliss and Flannery note that effective market discipline involves two distinct components: the ability of security holders to accurately assess the condition of a firm (monitoring) and the ability to have their assessments reflected in subsequent actions by management (influence). There is substantial evidence for the existence of market monitoring, but little existing evidence on market influence. Bliss and Flannery find that security price changes have no influence on subsequent managerial actions. The statistical linkages between security returns and subsequent management actions are consistent with monitoring, but not

influence. They conclude that, for the moment, market discipline *per se* remains a matter of faith and not evidence.

In the early 1990s, after decades of high inflation and financial repression, Argentina embarked on a course of macroeconomic and bank regulatory reform. Bank regulatory policy promoted privatization, financial liberalization, free entry, and limited safety net support, and it established a novel mix of regulatory and market discipline to ensure stable growth of the banking system during the liberalization process. Argentina suffered some fallout from the Mexican tequila crisis of 1995, but its response to that crisis (allowing weak banks to close) and the redoubling of regulatory efforts to promote market discipline after the crisis made Argentina's banking system quite resilient during the Asian, Russian, and Brazilian crises. Argentina's bank regulatory system is now widely regarded as one of the two or three most successful examples among emerging market economies. **Calomiris** and **Powell** trace the evolution of Argentina's regulatory policy changes of the 1990s and show that the reliance on market discipline as part of the regulatory process played an important role, encouraging proper risk management by banks.

Previous research has shown that confidential supervisory information can improve macroeconomic forecasts of inflation and unemployment rates, two variables critical for the conduct of monetary policy. Thus, synergies between monetary policy and bank supervision could be an important consideration for determining the regulatory structure of bank supervision. Data about the set of institutions currently supervised by the Federal Reserve System provide information that can substantially improve Fed forecasts. However, **Peek, Rosengren, and Tootell** find that the most useful information comes from the data on state-chartered banks. If regulatory structure were to be based on which institutions provide the greatest synergies for monetary policy, then the set of banks supervised by the Federal Reserve System would be quite different from those currently under its regulatory structure.

These papers and their discussions will be published in an NBER Conference Volume by the University of Chicago Press. The volume's availability will be announced in a future issue of the *NBER Reporter*. These papers also can be found at "Books in Progress" on the NBER's Web site, www.nber.org.



Labor Markets and Firm Benefit Policies in Japan and the United States

The NBER and the Japan Center for Economic Research (JGER) held a joint conference on "Labor Markets and Firm Benefit Policies in Japan and the United States" in Hawaii on January 20-23. The following papers were discussed.

Andrew A. Samwick, NBER and Dartmouth College, and **David A. Wise**, NBER and Harvard University, "Option Value Estimation with Health and Retirement Study Data"

Discussant: Yukiko Abe, Asia University

Makoto Kawamura and **Seiritsu Ogura**, Hosei University, and **Tamotsu Kadoda**, JGER, "Reengineering the Japanese Social Security System: Treating Everyone Equally in Health Insurance and Saving Money"

Discussant: David M. Cutler, NBER and Harvard University

Yukiko Abe, "Fringe Benefit Provisions for Female Part-Timers in Japan"

Discussant: David A. Wise

David M. Cutler, "Supplementing Public Insurance Coverage with Private Coverage: Implications for Medical Care Systems"

Discussant: Tadashi Yamada, University of Tsukuba

Tadashi Yamada, "The Demand for Health Checkups and Uncertainty"

Discussant: Mark B. McClellan, NBER and Stanford University

Seiritsu Ogura and **Takehiko Higino**, JGER, "Why Do the Japanese Spend So Much on Drugs?"

Discussant: Mark B. McClellan

Matthew J. Eichner, NBER and Columbia University, **Mark B. McClellan**, and **David A. Wise**, "Individual Expenditures and Medical Saving Accounts: Can They Work?"

Discussant: Seiritsu Ogura

Toshiaki Iachibanaki, Kyoto University, "The Role of Firms in Welfare Provisions"

Discussant: Andrew A. Samwick

Takao Kato, Colgate University, "The Recent Transformation of

Participatory Employment Practices in Japan"

Discussant: Hiroyuki Chuma, Hitotsubashi University

Yuji Genda, Gakushuin University, "Who Really Lost Jobs in Japan? Youth Employment in the Aging Japanese Society"

Discussant: Takao Kato

Hiroyuki Chuma, "Determinants of the Shadow Value of Concurrent Information-Sharing in Japanese Machine Toolmakers"

Discussant: Richard B. Freeman, NBER and Harvard University

Richard B. Freeman, "Changing the Guard: The Rise of the United States to Peak Capitalist Economy"

Discussant: Toshiaki Iachibanaki, **Yoshifumi Nakata**, Doshisha University, "Total Labor Cost and Employment Level Adjustment under the Shinko System"

Discussant: Takao Kato

Fumio Otake, Osaka University, "Unions, Cost of Job Loss, and Nonattendance"

Discussant: Richard B. Freeman

Do financial incentives designed to delay retirement actually work? Using Health and Retirement Study data, **Samwick** and **Wise** find that both pension wealth and pension incentives have statistically significant effects on the probability of retirement. These effects are more robust when retirement is defined only as a job separation rather than as a complete transition out of the labor force. Samwick and Wise also investigate possible interactions between the effects of wealth, health, and health insurance on retirement.

Kawamura, **Kadoda**, and **Ogura** suggest that Japan's elderly health

care system and its National Health Insurance (NHI) programs together have created a crisis in Japanese public health insurance. The two systems transfer funds from corporate employees and general tax revenues to pay health benefits, but beneficiaries themselves pay relatively little. As Japan's population ages, the number of health care beneficiaries continues to grow, putting enormous pressures on Japan's national budget and increasingly alienating corporate employees, who now pay almost twice the costs of their own health care. The authors then ask what would happen if the elderly health care sys-

tem were eliminated, and if NHI collected enough revenue via consumption taxes to pay its own costs. Their results suggest that the number of welfare cases would roughly double, to about two million households, but that a drastic reduction in cross-subsidization would be achieved.

Abe documents patterns of participation in social insurance programs by female part-time workers in Japan and asks how the structure of the social insurance system affects that participation. Because participation in social insurance programs—such as public pensions, health insurance, and Employment Insurance—is re-

quired only for workers who put in enough hours or earn enough, many part-time workers are not required to participate. Currently, the financial incentives for participation are weaker for married women and older workers than for others. Abe finds that from 1990 to 1995, for workers who satisfied the hours and earnings conditions for social insurance insurance programs, the married women and older workers were no less likely to participate than others. On the other hand, among workers who did not meet these same conditions, married women and older workers were significantly less likely to participate. Female part-time workers did increase their participation in social insurance programs from 1990 to 1995, not because of changes in the labor supply but because of a general increase in participation, Abe concludes.

Cutler considers the rationale and economic effects of allowing supplemental medical insurance to exist. Countries may allow three types of insurance supplements: insurance for uncovered services, which most countries allow; insurance to pay for cost sharing under the standard government insurance plan, which some countries allow but others do not; and insurance that allows people to jump to the front of queues, again allowed in some countries but prohibited in others. In the United States, insurance to pay for cost sharing under Medicare is common. Cutler shows that such insurance raises Medicare spending by up to one-third.

Good health enhances market earnings by increasing the number of days that employees work and by increasing their nonmarket productivity in terms of time spent on household production. And, health checkups are one way to secure good health. **Yamada**, using sample data from Japan's 1995 Comprehensive Survey of Living Conditions

of the People on Health and Welfare, finds that a number of socioeconomic and demographic factors determine the demand for health checkups among workers aged 30 to 60. These factors include age, gender, earnings, type of health insurance coverage, firm size, occupation, and objective evaluation of health condition. Furthermore, Yamada shows that health checkups do reduce the probability of becoming ill and of becoming a hospital in-patient. His evidence strongly supports the theory that medical checkups are highly cost-effective as preventive medical care.

In Japan, prescription drug expenditures account for a huge proportion of total health care costs. Among five major countries, Japan and France each rank at the top in absolute terms for per-patient drug costs, spending more than three times as much as Great Britain, twice as much as the United States, and one and a half times as much as Germany. **Ogura** and **Hagino** establish that this is the result of a systematic distortion in drug price controls. The government's attempts to control drug prices have failed, as drug companies have been allowed to substitute old drugs with more expensive new drugs. Ogura and Hagino suggest that by removing distortions that encourage health care providers to select more expensive drugs, drug expenditures in Japan could be reduced by 20 percent or more.

Low levels of household savings in the United States essentially make catastrophic health insurance plans infeasible since most households would find it difficult to pay even modestly large medical expenditures. Medical savings accounts (MSAs) offer one way to accumulate funds from which medical expenses could be paid under a catastrophic health insurance plan, making individuals responsible for determining whether the benefit of the treatment is worth

the price of care. **Eichner, McClellan**, and **Wise** consider whether the pattern of individual medical expenditures over time presents an important limit on the feasibility of MSAs. Based on the illustrative plan they simulate, the authors find that most employees would approach retirement with a substantial proportion of MSA contributions remaining in the account. Thus they conclude that the persistence of medical expenditures does not present an overriding obstacle to the adoption of MSA plans.

Tachibanaki presents five theoretical justifications that explain why firms contribute to welfare provisions: 1) agency theory, 2) tax advantage, 3) employees' preference, 4) cost savings, and 5) improved industrial relations. He then shows that the importance of these five justifications has declined recently in Japan. Tachibanaki proposes that two arrangements can substitute for contributions to welfare: an increase in wages, provided that the payroll tax incidence in Japan is known; and introducing a progressive expenditure tax.

Kato shows that Japanese firms have continued to use participatory employment practices, even during the overall economic slowdown in the 1990s and the recent financial crisis at the end of the decade. However, he points to a few early signs of trouble for these practices. First, while the number of full-time union officials has been falling substantially as a result of continued labor force downsizing, the amount of time and effort needed to put participatory employment practices in place has not changed. This often results in an uncompensated increase in workload for union officials, which could lead to their being less prepared and less committed to the interest of the rank and file. Second, top management may find its participatory system detrimental to timely and efficient management and hence try to streamline it. Overloaded union officials

could offer less resistance to this type of management initiative. Third, the current system tends to produce a gap in the quantity and quality of information acquired from management between top union officials and their general membership. Such a gap eventually may result in the breakdown of the participatory system.

Young workers likely face more difficulty than middle-aged or senior workers in finding full-time jobs in an aging Japanese society. Yet job opportunities for middle-aged and senior employees are being maintained and protected, while no clear answers or political strategies have been found for solving the decline in youth employment in Japan. **Genda**, using cohort analysis, a job creation and destruction framework, and labor flow functions, shows that decreasing the chance for youths to acquire skills and restricting dismissals severely by law results in the displacement of youths in Japan's labor market.

Japan has led the world in machine tool production since 1982. In examining how the Japanese machine tool industry has achieved this record, **Chuma** maintains that human relations practices have been especially important. He finds that a concurrent comprehensive and egalitarian information-sharing system exists between production workers and design and development engineers. This type of system was established in Japan in the 1980s, when machines had become so complex that close collaboration among various

professionals and designers was essential. His questionnaire data confirm the statistical analysis which predicts that this information-sharing system is likely to occur more frequently in machine toolmakers that retain both highly skilled assembly workers and machinists, produce lathes, and have more than 100 full-time workers.

In the 1990s, many analysts viewed the United States as the peak capitalist economy, whose institutions other countries would be wise to emulate. By contrast, in the 1970s and 1980s, many analysts viewed Japan as the peak capitalist economy. **Freeman** develops criteria for judging which, if any, extant economy might be legitimately labeled the peak economy. He examines the features of the U.S. variant of capitalism and compares them to those of the Japanese variant. Freeman then evaluates the employment, wage, and productivity growth record of the United States and Japan to determine whether the shift in the peak label from Japan to the United States is justified. He concludes that the case for the United States as peak capitalist economy rests almost entirely on the country's 1990s job market performance. Only as long as full employment lasts will that label be legitimate.

People have long believed that Japanese firms, particularly large ones, have upheld their employment commitments to workers despite any unfavorable economic conditions. But now, this practice has been criticized as the major cause of the pro-

longed Heisei recession. **Nakata** compares the employment adjustment among different industries and among firms in those industries and uses per-capita total labor cost in place of average monthly salary as the relative factor price variable reflecting the growing share of nonwage total labor costs. He also uses both single firm data and consolidated firm data to investigate the impact of Shukko, a common Japanese employment practice of dispatching workers to their related firms. Nakata finds that large scale employment adjustment is not uncommon among major Japanese firms. Employment adjustment is both firm and industry specific: in other words, the patterns of employment adjustment vary by industry and by firm within an industry. When redundancy is considered, total labor cost is relevant as the firm labor cost variable. Finally, when the Shukko effect on employment stability is tested, the results are consistent with the author's Shukko hypothesis.

Otake hypothesizes that the presence or absence of a union influences the effectiveness of internal and external threats in reducing non-attendance. He argues that, because unions reduce the potency of threats of job loss (by making it more difficult for employers to dismiss workers), nonattendance responds less to such threats in union firms than in nonunion firms. An analysis of data from the 1985 and 1993 General Surveys on Working Hours and Conditions in Japan supports this hypothesis.

The Korean Currency Crisis: The Third Country Meeting of the NBER Project on Exchange Rate Crises in Emerging Market Countries

The third in a sequence of country-specific meetings of the NBER Project on Exchange Rate Crises in Emerging Market Countries, directed by NBER Research Associate Jeffrey Frankel, was held in Cambridge on February 2, 2000. Following successful meetings on Mexico and Thailand, this gathering focused on Korea. Jeffrey Frankel, NBER and Harvard University, and Jong-Wha Lee and Yung Chul Park, Korea University, organized the meeting. In addition to academic researchers, the participant list included high-level past and current officials of the Korean and U.S. governments, as well as key personnel from the IMF, World Bank, and financial community. As outlined in introductory remarks by National Bureau President Martin Feldstein, a key purpose of the meeting was to discuss different perceptions of what happened in Korea, and, hopefully, to leave with a better understanding of the crisis.

The day's proceedings were divided into four chronologically organized sessions. Each session followed a format of short presentations by various experts and a free flowing general discussion. A full report on the conference—including

an outline of the main themes of the general discussion—is available on the NBER's web site. The program was:

Session 1: Build-up to the Crisis in 1997

Chair: Martin Feldstein

Panelists:

Bohn Young Koo, Chairman of the Board, Korean Center for International Finance

Nouriel Roubini, U.S. Department of Treasury (formerly Chief Staff Economist at CEA)

Jeffrey Shafer, Salomon, Smith, Barney (formerly Assistant Secretary of the Treasury for International Affairs)

Wanda Tseng, Deputy Director, Asia and Pacific Department, IMF

Session 2: Crisis and Macroeconomic Adjustments

Chair: Yung Chul Park

Panelists:

Kang-Nam Lee, Assistant Governor, Bank of Korea

David Lipton, Moore Capital Strategy Group (formerly Under Secretary of the Treasury for International Affairs)

Timothy Lane, Chief of Policy Review Division, IMF

David Pflug, Senior Credit Executive and Managing Director of Chase Manhattan's Global Bank

Session 3: Restructuring and Economic Recovery

Chair: Jong-Wha Lee

Panelists:

Ajai Chopra, Division Chief of the Korea Desk, Asia and Pacific Department, IMF

Kap-Soo Oh, Assistant Governor, Financial Supervisory Service

Zia Qureshi, Lead Economist and Country Program Coordinator, East Asia and Pacific Region, The World Bank

Caroline Atkinson, U.S. Department of Treasury

Session 4: Lessons and Prospects for the Future

Chair: Jeffrey Frankel

Panelists:

Martin Feldstein

Paul Krugman, MIT and NBER

Rak-Yong Uhm, Vice Minister, Ministry of Finance and Economy

Richard Cooper, Harvard University

Lael Brainard, Deputy Director of the National Economic Council, Assistant to the President

In the first session, there was an evident split on the panel between those who see the crisis as the product of severe structural weaknesses in the economy and those who see it mainly as a liquidity crisis. To those who hold the first view, the crisis was an almost inevitable punishment for the sins of "crony capitalism." Those who hold the second view typically

admit that there were mistakes in economic management, but they also point to such factors as contagion effects from other countries and the herding behavior of foreign investors. **Roubini** was the clearest exponent of the structural weakness view, highlighting twelve vulnerabilities—ranging from the bankruptcy of a number of the chaebol to significant

political uncertainty—already apparent in early 1997. Offering the perspective of the former government official, **Koo** argued for the liquidity crisis view. He contended that the essence of the crisis was that foreign banks refused to roll over short-term debt, and he offered various reasons for their unwillingness. **Shafer** agreed that the crisis was fundamen-

Otally a liquidity crisis, but concentrated his remarks on understanding the timing of the crisis. Among the factors he emphasized was the evasiveness of Korean government officials even after the IMF program of December 1997. This led to a loss of confidence and an acceleration of bank outflows. **Tseng** drew attention to the differences between the Korean case and previous crisis situations that the IMF had faced. She stressed that while it is true that Korea did experience a liquidity crisis—the debt had to be extended—major fundamental weaknesses underlay the loss of investor confidence. The policy content of the IMF programs was aimed at the structural weaknesses.

In the second session the panelists considered how the creditor panic of late 1997 and early 1998 was resolved. Among the questions considered: How did the late-December 1997 program differ from the earlier December 4 program? What was the effect of the initial IMF programs? Would some combination of devaluation and expansionary monetary policy have avoided the recession?

K. N. Lee started with a Korean central banker's perspective on the turnaround. He stressed the importance of international funds in overcoming the crisis, and the importance of getting the private sector on board. Echoing themes from the first session, he said that the crisis was caused by a sort of herd behavior. To regain investor confidence it was necessary to push for wide ranging economic reforms. **Lipton** then offered the perspective of a former Assistant Secretary of the U.S. Treasury who had dealt with the Korean crisis. As the Treasury saw it, it was crucial to put in place policies that would restore currency stability and prevent an internal run. He also offered various lessons for similarly crisis-affected

countries, including the need for a firm monetary stance to lean against the pressures on the currency and the advantages of starting deep structural reforms to restore market confidence. **Lane** offered the perspective of the IMF. He added that he has been part of an *ex post* assessment of what the IMF was trying to do, and why it did not turn out as well as expected. He stressed that given the financial and corporate sector weaknesses, Korea was hugely vulnerable—including vulnerability to domestic residents moving their money out—unless credible commitments could be made to reform. He also addressed issues related to fiscal policy, the “iron logic of the reserve position,” and the difficulty of bailing private creditors in. Finally, **Pflug** added the viewpoint of a private sector participant in the debt maturity restructuring. He raised various issues, including the role of the Basle requirements on the behavior of the international banks, the impact of the rating agencies (initially overrating Korea and then dropping the rating three times), and the conflicted role of the creditor banks in being asked to restructure debt.

In the third session the focus moved to the actual progress in financial and corporate sector reform. Session chairman **J. W. Lee** also posed two important questions for consideration in the session. First, referring to Korea's famous V-shaped recovery, he asked, “How did Korea recover so fast?” And second, “Do the reforms mean sustainable growth in the future?”

Chopra opened by stressing the IMF's heavy emphasis on promoting recovery. In charting the Korean recovery, he then used Sweden, Finland, and Mexico as standards of comparison. Next **Oh** offered the perspective of a Korean financial supervisor. He pointed to the im-

proved condition of the financial sector, noting such outcomes as the reduced number of banks and investment companies and the enhanced use of forward looking criteria for judging the credit worthiness of borrowers. He also listed various improvements that had been made in the financial structure of the corporate sector. **Qureshi** continued the emphasis on financial and corporate sector reforms. On the depth of reforms, Qureshi believes that Korea compares favorably with other crisis affected East Asian economies and with post-crisis Mexico. In the corporate sector major progress has been made in reducing debt-equity ratios. Yet further progress is needed for the current recovery to be translated into sustained growth. He listed a number of areas that needed further effort, including the problem of “reprivatizing” the financial sector and the dangers of “regulatory arbitrage” associated with the increase in assets of non-bank financial institutions. **Atkinson** followed Qureshi by asking if the recovery was a surprise. She offered the example of Mexico as a country that had a sharp turnaround in its current account and a recession, yet also had a fast turnaround in economic activity. Echoing Lipton and Shafer from earlier sessions, she stressed the importance of tight money in turning confidence around.

Feldstein opened the final session by questioning the wisdom of the IMF and World Bank's drive to reform the economy along multiple dimensions. He asked if they would have done that for any other OECD country. Arguing that there was a need to go back to an older, more narrowly focused approach, he said that the focus should have been on getting the private sector obligations rolled over, paying down the debt and building reserves. The focus also

should have been on crisis prevention and management—but not on long-term growth—in a country that had been as successful as Korea. **Krugman** started off his presentation by restating a disagreement that he felt had lurked in the discussion all day: Does the recovery show that the policy response to the crisis was correct? Or, since the economy recovered so quickly, was there a need to have the crisis in the first place? He thinks it is difficult to tell. He also argued that the structural versus liquidity distinction is not very useful. A better distinction is between the bursting of a bubble and a bank run. Krugman addressed various other issues ranging from the role of structural reforms in the recovery, to the impact of high interest rates on the

exchange rate and the possible advantage that Korea's underdeveloped financial system gave it in organizing private sector creditor involvement in debt restructuring. **Uhm** argued that there is a need to deal with the vulnerabilities that led to the crisis: both issues related to short-term liabilities and structural weaknesses. Among other points, he stressed the value of social cohesion (noting that it was not a coincidence that the crisis broke out during a political transition), and the need for reforms to the international financial architecture to protect small open economies. In a wide-ranging presentation, **Cooper** made a number of observations on the Korean crisis including: the inherent instability of financial systems; the fact that Korea

had committed the standard error of borrowing short and lending extremely long; and the large contribution of the exchange rate depreciation to the economic recovery. **Brainard**, Assistant to the U.S. President during the crisis period, made the final presentation of the day. She began by asking why it is possible to see such a rapid decline in a country, and why financial variables are capable of turning around so quickly. She also dealt with the importance of psychological factors in the response of the financial system, which led her to the role of politics. In the case of Korea, the ability of President Kim to take difficult steps did turn confidence around, with the structural reforms seen as putting Korea on a sustainable long-run growth path.



Coping with the Pension Crisis—Where Does Europe Stand?

The NBER and the Kiel Institute of World Economics sponsored a joint conference on "Coping with the Pension Crisis—Where Does Europe Stand?" in Berlin on March 20 and 21. Martin Feldstein, NBER and Harvard University, and Horst Siebert, Kiel Institute of World Economics, organized the program. The purpose of this project is to examine the different approaches to social security reform in Europe. Ten country studies and three broader analyses were presented at the conference.

The papers presented show that all European countries are experiencing rapidly aging populations that will cause sharp increases in the cost of retirement income over the next several decades. Britain and the Netherlands have already shifted to pension systems that are primarily investment-based rather than pay-as-you-go; therefore, they do not face large increases in taxes in the years ahead. Several other countries are moving toward mixed systems that will use both a pay-as-you-go and an investment-based approach. The countries with this type of approach that were analyzed as part of the NBER-Kiel project include Sweden, Finland, Poland, Hungary, and Romania. Italy has adopted an unfunded, defined contribution system with a small step toward greater reliance on investment-based accounts. France and Germany have made few changes and face very large tax increases or benefit cuts. A common feature of the European reforms of social security over the past 20 years has been substantial reductions in benefits.

The two-day agenda was:

Jonathan Gruber, NBER and MIT, and **David A. Wise**, NBER and Harvard University, "Different Approaches to Pension Reform from an Economic Point of View"

Discussant: Herbert Hax, Cologne University

Alain Jousten and **Pierre Pestieau**, Universite de Liege, "Labor Mobility, Redistribution, and Pension Reform in Europe"

Discussant: Michael Burda, Humboldt University of Berlin

Assar C. E. Lindbeck, Stockholm University, "The Challenge of a Changing Socioeconomic Environment to Social Security" (No discussant for this paper.)

Bert Rürup, Institut für Volkswirtschaftslehre, "The Future of the German Pension System: Stabilization of Contributions by a Mandatory Savings Plan"

Discussant: Axel H. Boersch-Supan, NBER and University of Mannheim

Didier Blanchet, INSEE, and **Florence Legros**, University of Paris IX, "France: The Difficult Path to a Consensual Reform"

Discussant: Martine Durand, OECD

Daniele Franco, Banca d'Italia, "Italy: A Never Ending Pension Reform"

Discussant: Franco Peracchi, Tor Vergata University

Jukka Lassila and **Tarmo Valkonen**, ETLA, "Prefunding in a Defined Benefit Pension System—The Finnish Case"

Discussant: Reijo Vanne, Central Pension Security Institute

Jeroen J. M. Kremers, Finance

Ministry of the Netherlands, "Pension Reform: Issues in the Netherlands"

Discussant: Lans Bovenberg, Tilburg University

Edward Palmer, National Social Insurance Board, Stockholm, "Swedish Pension Reform—How Did It Evolve and What Does It Mean for the Future?"

Discussant: Laurence J. Kotlikoff, NBER and Boston University

David Blake, University of London, "The United Kingdom: Examining the Switch from Low Public Pensions to High-Cost Private Pensions"

Discussant: Andrew A. Samwick, NBER and Dartmouth College

Jerzy Hausner, Cracow University of Economics, "Poland: Security through Diversity"

Discussant: John F. McHale, Harvard University

Roberto Rocha and **Dimitri Vittas**, World Bank, Hungary, "The Hungarian Pension Reform: A Preliminary Assessment"

Discussant: John F. McHale

Georges de Menil, Pro Democracy Foundation, Bucharest, **Eytan Sheshinski**, Hebrew University, Jerusalem, "Romania's Pension System: From Crisis to Reform"

Discussant: John F. McHale

Panel Discussion: Where Will Europe Go?

Martin Feldstein, **Assar C. E. Lindbeck**, **Horst Siebert**; and **Ignazio Visco** of the OECD

incremental measures to a complete switch towards a prefunded system.

Jousten and **Pestieau** discuss the main characteristics of mandatory pension systems in Europe and the implications of these systems for increas-

ing factor mobility. Increased mobility of labor, the authors suggest, leads to a decrease in the extent of income redistribution, even if the mobility is limited to some particular subgroups in the working population.

In their overview paper, **Gruber** and **Wise** explain the various problems that social security systems currently face. They then describe and comment on different approaches to addressing these problems, from

Lindbeck analyzes how different types of pension systems transmit socioeconomic shocks to individuals and how the incentive structures of these pension systems induce socioeconomic changes. The relationship between socioeconomic development and the pension system depends not only on whether pensions are fully funded but also on other, less fundamental characteristics. Lindbeck finds that combining pay-as-you-go and funded systems balances the advantages and disadvantages of each.

Rürup discusses how introducing a mandatory supplementary funded pillar to Germany's existing pay-as-you-go pension system could help to maintain the system's financial stability and provide for Germans' old-age security.

Blanchet outlines the French debate over pension reform that took place during the 1990s and the reforms implemented in that period. He focuses on the role that savings—be they from life insurance, employee savings schemes, or pension funds—play in preparing for retirement.

In reviewing the Italian pension system, **Franco** finds that some reform is necessary to ensure the system's long-term fiscal sustainability. The reforms implemented so far, while not without impact from the fiscal perspective, have been incomplete and have not broken the typical pattern of Italian policymaking. The lengthy reform process has reflected the demands of special interest groups, has generated uncertainty, and has diminished the gains in economic efficiency.

Lassila and **Valkonen** describe

the Finnish pension system, which consists of both national minimum pensions and earnings-related pensions. The earnings-related pensions are partly funded, while the minimum pensions are financed entirely on a pay-as-you-go basis. In the future, the authors expect small changes within the system rather than fundamental reforms of the whole system. Compared to other international models, the financial position of the Finnish pension system appears healthy.

Kremers argues that the Dutch pension system is perhaps the most funded collective pension system in the world: it combines a basic pension with a compulsory and fully funded second pillar. Because of that second pillar, the system is relatively sound financially. Thus, any reforms of the earnings-related system might be aimed at giving more freedom for individual choices and improving the system's efficiency.

Palmer describes the main features of the Swedish pension reform of 1994, which may be seen as a paradigm shift in thinking about the provision of public pensions. Sweden now has a two-pillar public pension system: a pay-as-you-go pension as the first pillar and a funded, privately managed second pillar. Both components of the pension scheme are based on individual lifetime accounts.

The United Kingdom is one of the few European countries not facing a serious pension crisis. This is because of the small size of its public pension system, the long-standing funded private pensions sector, comparatively favorable demographic development, and the government measures taken since the early 1980s to

prevent a pension crisis from developing. However, **Blake** identifies several potential problems with respect to the provision of pensions by the private sector.

Hausner explores the reasons behind the financial insolvency of the Polish pension system and describes the nature of the newly introduced multipillar system. He finds, however, that Poland's pension reform program remains incomplete: the major problem currently lies with the organizational inefficiency of the system's public administration in general and with the Social Insurance Institution in particular.

Rocha and **Vittas** review the main components and objectives of the Hungarian pension reform and preliminarily assess the first two years of its implementation. They find that the overall reforms can be called a success, although substantial shortcomings still exist and further adjustments probably will be required.

De Ménil and **Sheshinski** discuss Romania's prereform situation and the architecture of its new public and private pension system. The authors evaluate budgetary implications and economic effects and conclude that, in a country lagging behind in economic reforms and consisting of relatively poorly developed financial markets, the success and safety of the system depend critically on the supervisory body's authority, effectiveness, and independence from political influence.

These papers and their discussion will be published as an NBER volume and will also soon be available at "Books in Progress" on the NBER's web site, www.nber.org.

O Fifteenth Annual Conference on Macroeconomics

The NBER held its Fifteenth Annual Conference on Macroeconomics in Cambridge on April 7 and 8. Ben S. Bernanke, NBER and Princeton University, and Kenneth S. Rogoff, NBER and Harvard University, organized the conference at which the following papers were presented and discussed.

Daron K. Acemoglu and **Joshua D. Angrist**, NBER and MIT

"How Large Are Human Capital Externalities? Evidence from Compulsory Schooling Laws" (NBER Working Paper No. 7444)

Discussants: Mark Bils, NBER and University of Rochester, and Cecilia E. Rouse, NBER and Princeton University

Allan Drazen, NBER and University of Maryland, "The Political Business Cycle after 25 Years"

Discussants: Alberto F. Alesina, NBER and Harvard University, and Cale F. Walsh, University of California, Santa Cruz

Steve E. Morris, Yale University, and **Hyun S. Shin**, Oxford University, "Rethinking Multiple Equilibria in Macroeconomic Modeling"

Discussants: Andrew G. Atkeson, NBER and University of Minnesota, and Helene Rey, London School of Economics

Hal Cole, Federal Reserve Bank of Minneapolis, and **Lee Ohanian**, University of California, Los Angeles, "Re-examining the Contributions of Money and Banking Shocks to the U.S. Great Depression"

Discussants: Michael D. Bordo, NBER and Rutgers University, and Mark Gertler, NBER and

New York University

Francisco Rodriguez, University of Maryland, and **Dani Rodrik**, NBER and Harvard University, "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-national Evidence" (NBER Working Paper No. 7081)

Discussants: Chiang T. Hsieh, Princeton University, and Chad Jones, NBER and Stanford University

Maurice Obstfeld, NBER and University of California, Berkeley, and **Kenneth S. Rogoff**, "The Six Major Puzzles in International Finance: Is There a Common Cause?"

Discussants: Charles M. Engel, NBER and University of Washington, and Olivier Jeanne, International Monetary Fund

These papers and their discussions will be published by the MIT Press in the *NBER Macroeconomics Annual 2000*, Volume 15. Its availability will be announced in a future issue of the *NBER Reporter*. The conference versions of the papers can be found at <http://www.nber.org/books/macro15/index.html>.

Many economists and policymakers believe that education creates positive externalities. Indeed, the average level of schooling in the U.S. states is highly correlated with state wage levels, even after the direct effect of schooling on individual wages is considered. **Acemoglu** and **Angrist** use variation in child labor laws and compulsory attendance laws over time and across states to investigate whether this relationship is causal. They show that the private returns to education are around 7 percent, and that the external returns to education are approximately 1 to 2 percent.

Drazen surveys and assesses previous research on the political business cycle since the mid-1970s. He argues that models based on mone-

itary surprises as the driving force are unconvincing explanations of either opportunistic or partisan cycles. Instead, fiscal policy is likely the driving force, with monetary effects occurring as the result of accommodation of fiscal impulses. Drazen's preferred political business cycle model combines active fiscal policy and passive monetary policy (he terms this the AFPM model).

Morris and **Shin** investigate whether beliefs are as indeterminate as models with multiple equilibria suggest. Multiple equilibria may be the unintended consequence of two modelling assumptions: that fundamentals are commonly known, and that economic agents know others' actions in equilibrium. Both assumptions are questionable. When

others' actions are not known with certainty, for example, when these actions rely on noisy signals, then self-fulfilling beliefs lead to a unique outcome determined by the fundamentals and the simple knowledge that others are rational. Morris and Shin illustrate this approach in the context of a model of bank runs and with other similar applications. They conclude that public information has a disproportionately larger impact on the outcome than private information does.

Using general equilibrium models, **Cole** and **Ohanian** evaluate the contribution of deflationary money shocks (operating through imperfectly flexible wages in certain sectors) and financial intermediation shocks (operating through bank failures) to the

Great Depression. Specifically, they ask whether these shocks could reasonably have driven down output per adult nearly 40 percent relative to trend between 1929 and 33. They find that money shocks and banking shocks operating this way explain only a relatively small fraction of the Great Depression. They also find that other predictions of the theories are at variance with the data. These results thus raise questions about the money and banking hypothesis as an explanation of the Great Depression in the United States.

Do countries with lower policy-induced barriers to international

trade grow faster than other countries, once other relevant characteristics are taken into account? **Rodriguez** and **Rodrik** argue that in many cases, the indicators of "openness" used by earlier researchers have been poor measures of trade barriers, or were highly correlated with other sources of bad economic performance. In other instances, the methods used to ascertain the link between trade policy and growth had serious shortcomings. Rodriguez and Rodrik find little evidence that open trade policies—in the sense of lower tariff and nontariff barriers to trade—are significantly associated with eco-

nomic growth.

Obstfeld and **Rogoff** claim that by explicitly introducing costs of international trade (narrowly, transport costs, but more broadly, tariff and nontariff barriers), economists can explain a number of the central empirical puzzles that they have struggled with over the last 25 years. If this one simple alteration to an otherwise canonical international finance model can help to explain the broad array of empirical puzzles that they describe, including some that previously seemed intractable, then a rich area for future research exists.

Innovation Policy and the Economy

The NBER held its first Annual Conference on Innovation Policy and the Economy in Washington, D.C., on April 11. The conference was organized by NBER Research Associates Adam B. Jaffe of Brandeis University and Joshua Lerner of Harvard University, and NBER Faculty Research Fellow Scott Stern of MIT. The following papers were presented and discussed.

Rebecca M. Henderson, NBER and MIT, and **Iain M. Cockburn**, NBER and Boston University, "Publicly Funded Science and the

Productivity of the Pharmaceutical Industry

Michael Kremer, NBER and Harvard University, "Creating Markets for New Vaccines: Rationale and Design Issues"

Carl Shapiro, University of California, Berkeley, "Navigating the Patent Thicket: Cross-Licenses, Patent Pools, and Standard Setting"

Shane M. Greenstein, NBER and Northwestern University, "Commercialization of the Internet: The Interaction of Public Policy and Private Choices, or Why

Introducing the Market Worked So Well"

David C. Mowery, University of California, Berkeley, and **Arvids A. Ziedonis**, University of

Pennsylvania, "Numbers, Quality, and Entry: How Has the Bayh-Dole Act Affected U.S. University Patenting and Licensing?"

Paul M. Romer, Stanford University, "Should the Government Subsidize Supply or Demand in the Market for Scientists and Engineers?"

U.S. taxpayers funded \$14.8 billion of health-related research last year, four times the amount that was spent in 1970 in real terms. **Henderson** and **Cockburn** evaluate the impact of these huge expenditures on the technological performance of the pharmaceutical industry. They conclude that the returns from this investment have been large and may be growing even larger. Public sector science creates new knowledge and

tools and produces large numbers of highly trained researchers, all of which are a direct and important input to private sector research. Further, public science sustains an environment in which for-profit firms can conduct their own basic research, which in turn contributes to the global pool of knowledge. Measured quite narrowly in terms of its effect on private sector R and D, the rate of return to public funding of biomedical

sciences may be as high as 30 percent per year. And these calculations are likely an underestimate, since they fail to fully capture the wider impact of pharmaceutical innovation on health and well-being. Indeed, the best may be yet to come: the continuing revolution in molecular biology that began in publicly funded laboratories 25 years ago, and continues to be driven by the academic research, promises dramatic

Oadvances in the treatment of disease. **Kremer** describes the economic rationale for committing in advance to purchase vaccines once they are developed. Historically, governments have stimulated vaccine research by paying for research inputs, for example through grants to researchers. While this approach remains appropriate for basic research, the development of the biotech industry increases the scope for encouraging the later, more applied stages of vaccine research through committing to buy vaccines. This has several advantages over paying for research inputs. First, it gives researchers strong financial incentives to focus on developing a marketable vaccine rather than pursuing other goals, such as publishing academic articles. Second, paying for vaccines, rather than funding research expenditures, provides pharmaceutical firms and scientists with incentives to select only those

Oresearch projects that have a reasonable chance of leading to a vaccine. With purchase commitments, the public pays only if a vaccine is actually developed. Finally, purchase commitments help to ensure that if vaccines are developed, they will reach those who need them. After outlining these advantages, Kremer explores how commitments to purchase vaccines could be designed.

Shapiro finds that in several key industries, including semiconductors, biotechnology, computer software, and the Internet, the current system is creating a "patent thicket": an overlapping set of patent rights requiring that those seeking to commercialize new technology obtain licenses from multiple patentees. The patent thicket is especially thorny when combined with the risk of "hold-up": the danger that new products will inadvertently infringe on patents issued after they were designed. The need to navigate the patent thicket and hold-up is especially pronounced in industries such as telecommunications and

computing in which formal standard-setting is a core part of bringing new technologies to market. Cross-licenses and patent pools are natural and effective ways to cut through the patent thicket, but each involves significant transaction costs. Antitrust law and enforcement, historically hostile toward cooperation among horizontal rivals, can easily add to these transaction costs. Yet a few relatively simple principles, such as the desirability of package licensing for *complementary* patents but not for *substitute* patents, can go a long way toward ensuring that antitrust will help to solve the problems caused by the patent thicket and hold-up rather than to exacerbate them.

Why did commercialization of the Internet go so well? **Greenstein** examines events in the Internet access market and emphasizes three themes. First, commercializing Internet access did not give rise to many of the anticipated technical and operational challenges. Entrepreneurs quickly learned that the Internet access business was commercially feasible. Second, privatization fostered attempts to adapt the technology to new uses, locations, market settings, and applications, and to extend it to other lines of business. This went well beyond what anyone would have forecast by examining the limited noncommercial uses for the technology prior to 1992. Third, the National Science Foundation was lucky. It commercialized the Internet access industry at a propitious moment, simultaneous with the growth of the World Wide Web. The Web thrived under decentralized and independent decisionmaking, fueling further growth.

Mowery and **Ziedonis** find that the Bayh-Dole Act had only a modest effect on the content of academic research and patenting at Stanford and the University of California. The most significant change in the content of research at these universities

was the rise of biomedical research and inventive activity. But the Bayh-Dole Act had little to do with this growth; indeed, the rise in biomedical research and inventions in both of these universities predates the passage of the Bayh-Dole Act. Both University of California and Stanford University administrators intensified their efforts to market faculty inventions in the wake of the Bayh-Dole Act. This enlargement of the pool of marketed inventions appears to have reduced the average "yield" (defined as the share of license contracts yielding positive revenues) of this population at both schools. But Mowery and Ziedonis find no decline in the "importance" or "generality" of the post-1980 patents of these two universities. In contrast, the patents issued to other U.S. universities that entered into patenting and licensing only after the effective date of the Bayh-Dole Act were less important and less general than the patents issued before and after 1980 to U.S. universities with longer experience in patenting. The patents of inexperienced academic patenters appear to have proved less significant (in terms of the rate and breadth of their subsequent citations) than those issued to more experienced university patenters. Therefore, the effects of the Bayh-Dole Act on entry may be as important as its effects on the internal "research culture" of U.S. universities in explaining the widely remarked decline in the importance and generality of U.S. academic patents after 1980.

Romer suggests that innovation policy in the United States has erred by subsidizing the private sector demand for scientists and engineers without asking whether the educational system encourages the supply response necessary for these subsidies to work. He suggests that the existing institutional arrangements in higher education limit this supply response. Romer discusses specific

programs that could directly increase the numbers of scientists and engineers available to the private sector.

These papers will be published

in an NBER "Annual" by the MIT Press. The availability of the volume will be announced in a future issue of the NBER *Reporter*. These papers

also can be found at "Books in Progress" on the NBER's Web site, www.nber.org.

Bureau News

Industrial Organization

The NBER's Program on Industrial Organization, directed by Nancy L. Rose of MIT, met at NBER's California office on January 28 and 29. Andrea Shepard, NBER and Stanford University, and Aviv Nevo, NBER and University of California, Berkeley, organized this program.

Peter C. Reiss and Matthew W. White, NBER and Stanford University, "A Prospective Valuation of Electric Utility Industry Restructuring in California" (Discussant: Steven T. Berry, NBER and Yale University)

David Genesove, Hebrew University of Jerusalem, "The Adoption of Offset Presses in the Daily Newspaper Industry in the United States" (NBER Working Paper No. 7076)

(Discussant: Scott Stern, NBER and MIT)

Marc Rysman, Boston University,

"Competition Between Networks: A Study of the Market for Yellow Pages"

(Discussant: Aviv Nevo)

David Dranove, Northwestern University, **Daniel P. Kessler**, and **Mark B. McClellan**, NBER and Stanford University, and **Marc Satterthwaite**, Northwestern University, "Information is Good—Except When It's Not: The Effects of Health Quality Report Cards"

(Discussant: Paul J. Gertler, NBER and University of California, Berkeley)

Fiona M. Scott Morton, NBER and Yale University, and **Florian Zettelmeyer**, University of California, Berkeley, "The Strategic Use of Store Brands in Retailer-Manufacturer Bargaining"

(Discussant: Kenneth S. Cole, University of California, Los Angeles)

Joel Waldfogel, NBER and University of Pennsylvania, "Preference Externalities: An Empirical Examination of Who Benefits Whom in Differentiated Producer Markets" (NBER Working Paper No. 7391)

(Discussant: Severin Borenstein, NBER and University of California, Berkeley)

Judith A. Chevalier, NBER and University of Chicago, "Why Do Firms Undertake Diversifying Mergers? An Analysis of the Investment Policies of Merging Firms"

(Discussant: Andrea Shepard)

Patrick Bajari and **Ali Hortacsu**, Stanford University, "Winner's Curse Reserve Prices and Indogenous Entry: Empirical Insights from eBay Auctions"

(Discussant: Susan Athey, NBER and MIT)

Reiss and White develop a model of household demand for electricity and use it to assess the consequences of restructuring the electric industry in California. Using data for a representative sample of California households, they also derive measures of the willingness of consumers to pay. Reiss and White then evaluate the effects on household welfare of vari-

ous price changes expected under California's 1996 electric utility restructuring law. The authors estimate that current implementation proposals would yield a welfare gain to California households of \$1.1 billion annually (in 1998 dollars) by 2002, and \$2.4 billion by 2008. These figures equal 5.4 percent and 12.3 percent respectively of the 1996 state

personal income tax. Reiss and White also find that these regulatory reforms are remarkably progressive in their distributional impact.

Genesove shows that the move to offset printing from letterpress in the daily newspaper industry in the United States was determined in part by the structure of the local market. In monop

Opers were quicker to adopt the new technology than high circulation papers; in duopoly markets the ranking was reversed. Genesove further shows that adoption of newer technology was at least partially determined at the firm rather than the newspaper level, although on the whole newspaper chains did not adopt earlier (or later) than nonchain newspapers. All else remaining the same, adoption occurred more quickly in nonindustrial states, Genesove finds.

Rysman studies the welfare trade-off between competition and monopoly in a market characterized by network effects: the market for Yellow Pages directories. A competitive market with many small directories will fail to take advantage of the network effects between advertisers and consumers. Rysman simultaneously estimates consumer demand for use of a directory, advertiser demand for ad-

vertising, and a publisher's first-order condition (derived from profit-maximizing behavior). He shows that, for a given directory, the demand for advertising increases with the amount of consumer usage; consumer usage increases with the amount of advertising, thus implying a network effect. Rysman uses his estimates to determine the optimal level of advertising in a given market and whether the market would benefit from more or less competition. He finds that there is under-entry in the market in equilibrium and that network effects are important in driving a wedge between the social optimum and the market equilibrium.

Dranove, Kessler, McClellan, and Satterthwaite develop a framework for analyzing the competing arguments about the value of health care quality report cards. These report cards are public disclosures of patient health outcomes at the level of the individual physician and/or hospital. Report cards may help to allocate the sickest patients to the

highest quality providers, but they also may give providers the incentive to totally decline to treat sick patients in order to improve their quality ranking. Using national data on Medicare patients at risk for cardiac surgery, the authors find that, in the short run, report cards in New York and Pennsylvania led to increased sorting of patients among providers and increased selection of healthy patients for surgery. Existing cardiac surgery report cards decrease patient and social welfare on net.

Morton and **Zettelmeyer** examine why a retailer would want to introduce a store brand in a particular category. Store brands differ from other brands in that they are unadvertised and their location "on the shelf" is determined by the retailer instead of the manufacturer. The authors propose three explanations for why retailers use store brands: to improve their negotiating position in relation to manufacturers; to price discriminate among consumers; and to take advantage of the marginal-average cost gap of national brand manufacturers. They then demonstrate that the existence of a store brand in a category changes the bargaining over supply terms between a retailer and the national brand manufacturers in that category. Retailers are more likely to carry a store brand in a category if the share of the leading national brand is higher, but the leading national brand share does not affect the market share of the store brand. Thus there may be a bargaining motive for the introduction of the store brand; Morton and Zettelmeyer propose that this is because the retailer can position the store brand to mimic the leading national brand.

Theory predicts that in markets with increasing returns the number of differentiated products—and resulting consumer satisfaction—grow with market size. **Waldfogel** documents this phenomenon for 246 U.S.

radio markets. By a mechanism that he terms "preference externalities," an increase in the size of the market brings additional products that are valued by others with similar tastes. Waldfogel examines preference externalities between black and white and between Hispanic and non-Hispanic radio listeners, as well as among listeners of different age groups. His findings are striking. Within groups, preference externalities are large and positive, but across groups they are small and possibly negative. For example, entry of black-targeted stations and black listening share will increase with the black population, but they are unaffected (or possibly reduced) by the size of the white population. Consequently, small groups receive less variety from the market. Forces that increase the size of the market, such as emerging satellite and Internet technologies, thus may increase the satisfaction of individuals whose preferences do not match those of their fellow local residents.

Using a sample of firms that undertook diversifying mergers between 1980 and 1995, **Chevalier** examines the investment behavior of these firms prior to their mergers. She shows that the investment patterns attributed in the literature to "cross-subsidization between divisions" are apparent in the pairs of merging firms *prior* to their mergers. Thus some of the cross-subsidization results in the literature may be attributable to selection bias. Chevalier also examines stock market responses to the announcement of diversifying acquisitions. The market believes that these acquisitions will create value. The event response to the merger is largely independent of measures of the extent to which the merger is diversifying, she finds.

Online auctions recently have gained widespread popularity and are one of the most successful forms of electronic commerce. **Bajari** and

Hortacsu examine a dataset of eBay coin auctions to explore features of online bidding and selling behavior. They first measure the extent of the winner's curse and find that, for a representative auction in their sample, a bidder's expected profits fall by 3.2 percent when the expected num-

ber of bidders increases by one. Then they document that costly entry is a key component in understanding observed bidding behavior: for a representative auction in their sample, a bidder requires \$3.20 of expected profit to enter the auction. Third, Bajari and Hortacsu study the seller's

choice of reserve prices. They find that items with higher book value tend to be sold using a secret, as opposed to a posted, reserve price with a low minimum bid. The authors find that this is roughly consistent with maximizing behavior.

Economic Fluctuations and Growth

Members and guests of the NBER's Program on Economic Fluctuations and Growth met at the Federal Reserve Bank of San Francisco on February 5. Nobel Prize-winning economist Milton Friedman of Stanford University was the group's luncheon speaker. Organizers George A. Akerlof (University of California, Berkeley) and Martin S. Feldstein (NBER and Northwestern University) put together this program.

Steven J. Davis, NBER and University of Chicago, and **Paul S. Willen**, Princeton University, "Using Financial Assets to Hedge Labor Income Risks: Estimating the Benefits" (Discussant: Deborah J. Lucas, NBER and Northwestern University)

Annamaria Lusardi, Dartmouth College, "Explaining Why So Many Households Do Not Save"

Discussant: **P. Douglas Bernheim**, NBER and Stanford University
Fernando E. Alvarez, NBER and University of Chicago, and **Urban J. Jermann**, NBER and University of Pennsylvania, "Using Asset Prices to Measure the Cost of Business Cycles"

Discussant: **Christopher A. Sims**, NBER and Princeton University

Michael Kremer, NBER and Harvard University, and **Daniel Chen**, Oxford University, "Income Distribution Dynamics with Endogenous Fertility"

Discussant: **Ronald Lee**, University of California, Berkeley

Olivier J. Blanchard, NBER and MIT, and **Justin Wolfers**, Harvard University, "The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence" (NBER Working Paper No. 7282)

Discussant: **Thomas J. Sargent**, NBER and Stanford University

Simon G. Gilchrist, NBER and Boston University, and **John C. Williams**, Council of Economic Advisors, "Transition Dynamics in Vintage Capital Models: Explaining the Postwar Catch-Up of Germany and Japan"

Discussant: **Lawrence J. Christiano**, NBER and Northwestern University

Davis and **Willen** characterize the covariance of asset returns and shocks to labor income for a hypothetical group of individuals defined in terms of gender, education, and age. They find that the correlation between income shocks and equity returns increases with educational attainment and surprisingly is negative for several gender/education groups. Davis and Willen then develop a life-cycle model with incomplete markets and use it to evaluate the portfolio choice

and welfare implications of hedging with financial assets. They find that there are large gains from trading a "full menu" of assets, exceeding \$15,000 in present value for many persons. Even a single asset can generate sizable gains for certain demographic groups. Thus, the hedging motive has significant consequences for the structure of the optimal portfolio.

Lusardi shows that there are vast differences in wealth holdings among

U.S. households, even in similar age groups. Further, a large percentage of U.S. households near retirement have little or no wealth. Approximately 30 percent of such households do little or no planning for retirement. Lusardi notes that planning is shaped by the experience of other individuals: older siblings or elderly parents, for example. Financial difficulties and declining health later in life also provide strong incentives for planning. Individuals who do plan are more likely

Oto hold large amounts of wealth and to invest their wealth in high return assets, such as stocks. Thus, planning plays an important role in explaining the saving behavior of many households.

Alvarez and Jermann measure the “marginal cost of consumption fluctuations,” that is the benefit of a small reduction in consumption fluctuations. They show that this measure is an upper bound to the benefits of reducing all consumption fluctuations. To measure the marginal cost of fluctuations, they fit a variety of nonstationary pricing kernels that reproduce key asset pricing statistics. They find that consumers would be willing to pay a very high price for reducing overall uncertainty about consumption. However, for consumption volatility corresponding to the business cycle frequencies, the marginal cost is about one-third of a percent of consumption, an estimate of the same order of magnitude as the one found by Lucas (1987). Alvarez and Jermann also clarify the link between the cost of consumption uncertainty, the equity premium, and the slope of the real term structure.

Kremer and Chen note that developing countries with highly unequal income distributions, such as Brazil or South Africa, face an uphill battle in reducing inequality.

Educated workers in these countries have a much lower birthrate than that of uneducated workers. Assuming that children of educated workers are more likely to become educated, the discrepancy in birthrates tends to increase the proportion of unskilled workers. This reduces their wages, and thus their opportunity cost of having children, creating a vicious cycle. The authors’ model incorporating this effect generates multiple steady-state levels of inequality, suggesting that in some circumstances temporarily increasing access to educational opportunities could permanently reduce inequality. The empirical evidence suggests that the fertility differential between the educated and uneducated is greater in less equal (income) countries, which is consistent with the model.

Two key facts about European unemployment must be explained: the rise in unemployment since the 1960s and the diversity of experiences in the individual countries. While adverse shocks potentially explain much of the rise in unemployment, there are not enough differences among these shocks to explain the differences across countries. Alternatively, explanations focusing on labor market institutions explain the current diversity of experiences well, but many of these

institutions predate the rise in unemployment. Based on a panel of institutions and shocks for 20 OECD nations since 1960, **Blanchard** and **Wolfers** find that the interaction between shocks and institutions is crucial to explaining both stylized facts. They test two specifications and their results suggest that institutions determine the relevance of the unemployed to wage setting, thereby determining the evolution of equilibrium unemployment rates following a shock.

Gilchrist and Williams consider a neoclassical interpretation of post-war growth in Germany and Japan that relies on a catch-up mechanism through capital accumulation in which technology is embodied in new capital goods. They emphasize that the “economic miracle” in Germany and Japan reflected a gap in “machines” rather than a gap in “ideas.” Using a putty-clay model of production and capital accumulation, Gilchrist and Williams capture many of the key empirical properties of Germany’s and Japan’s postwar experience, including persistently high but declining growth rates of labor and total factor productivity, the U-shaped response of the capital-output ratio, relatively stable investment-output ratios, and reasonable rates of return to capital during the transition path.



Insurance Project

Participants in the NBER's Insurance Project met in Cambridge on February 25 and 26. Project Director Kenneth A. Froot, NBER and Harvard University, and Howard C. Kunreuther, NBER and University of Pennsylvania, organized this program.

Dwight M. Jaffee, University of California, Berkeley, and **Thomas Russell**, Santa Clara University, "Behavioral Models of Insurance: The Case of the California Earthquake Authority."

Discussant: James Ament, State Farm Fire and Casualty Company

J. David Cummins, University of Pennsylvania, and **Olivier Mahul**, Institut National de la Recherche Agronomique, "Managing Catastrophic Risk with Insurance Contracts Subject to Default Risk"

Discussant: Kenneth A. Froot

Martin F. Grace and **Robert W. Klein**, Georgia State University, and **Paul R. Kleindorfer**, University of Pennsylvania, "The Supply of and Demand for Homeowners

Insurance with Bundled Catastrophe Coverages"

Discussant: Neil Doherty, University of Pennsylvania

Howard C. Kunreuther and **Mark V. Pauly**, University of Pennsylvania, "Insurance Decisionmaking and Market Behavior"

Discussant: Daniel Kahneman, Princeton University

Jeffrey R. Brown, NBER and Harvard University, **Oliver S. Mitchell**, NBER and University of Pennsylvania, and **James M. Poterba**, NBER and MIT, "The Role of Real Annuities and Indexed Bonds in an Individual Accounts Retirement Program"

Discussant: Richard H. Thaler, NBER and University of Chicago

David A. Moss, Harvard University, "Social Security"

Discussant: Peter A. Diamond, NBER and MIT

Martin F. Grace and **Richard D. Phillips**, Georgia State University,

"The Allocation of Governmental Regulatory Authority: Federalism and the Case of Insurance Regulation"

Discussant: Scott E. Harrington, University of South Carolina

Stewart C. Myers, NBER and MIT, and **James A. Read, Jr.**, The Brattle Group, "Surplus Allocation for Insurance Companies" (No discussant for this paper)

Igal E. Hendel, NBER and Princeton University, **Alessandro Lizzetti**, Princeton University, "The Role of Commitment in Dynamic Contracts: Evidence from Life Insurance" (NBER Working Paper No. 7470)

(No discussant for this paper)

Neil A. Doherty and **Kent A. Smetters**, University of Pennsylvania, "Moral Hazard in Reinsurance Markets"

Discussant: James R. Garven, Louisiana State University

Jaffee and **Russell** use the example of the California Earthquake Authority (CEA), the quasi-state agency organized in 1996 to replace the private market for earthquake insurance in California, and its customers to study a catastrophe insurance market. They describe three features of the CEA: 1) the values reflected in CEA premiums are higher than what many consumers feel is the probability of a major future earthquake and the expected losses from such a quake; 2) the CEA offers only partial insurance, because claims cannot be paid in full for events with insurable losses that exceed about \$7.2 billion; 3) the CEA contract initially provided only a high 15 percent deductible, while a "buydown" option to a 10

percent deductible was introduced in late 1999. The authors focus on how a welfare maximizing public agency such as the CEA should set premiums and coverage limits when its views of the probabilities and expected losses from earthquakes diverge from the views of its customers. Jaffee and Russell also analyze the preferences of consumers for insurance contracts, with or without deductible limits, when the payment of claims may be limited by financial constraints.

Cummins and **Mahul** develop a theoretical model of optimal contracting for financing large, infrequent events in which the payoffs are subject to both default risk and basis risk. Full insurance above a deductible is optimal when both parties

have the same perception of the seller's default risk. When this perception differs, the optimal insurance design depends on behavioral concepts that are standard in the literature of insurance economics, such as risk tolerance, and on concepts from actuarial science, such as hazard rates. Under some specific behavioral and actuarial assumptions, the first-best indemnity schedule should increase and be concave with losses. This could in part explain why the proportion of the loss reinsured decreases with the size of the loss in real-world reinsurance markets. The optimal hedging strategies in the reinsurance market and in the financial market can be derived from this first-best solution.

O Grace, Klein, and Kleindorfer find that price variation across states in homeowners insurance is significant and not explained completely by expected losses. Nearly every feature of homeowners policies and company characteristics is associated with premium levels and prices, they find. At the zip code level, there is some sensitivity between the supply of insurance and *price*—that is, as price increases, insurers are willing to supply a greater quantity of insurance. The authors also find some initial evidence that regulatory constraints on territorial rates reduce the supply of insurance, at least for homes with low value. For homes with high value, the effect of price regulation on the supply of insurance is less clear.

Many individuals one would expect to have insurance (for example, subsidized flood insurance) do not have coverage, while others who appear not to need protection against certain events actually have purchased a policy (for example, flight insurance). Furthermore, certain types of insurance policies that one might expect (or hope) to be marketed by insurers are not (for example, guaranteed renewability insurance for small group health insurance), while other policies that one would not expect to be marketed successfully exist on a large scale (for example, coverage with low or no deductible). **Kunreuther and Pauly** seek to explain these apparent contradictions. They first develop theories of the demand for insurance and the supply of coverage in a world of perfect information and no transaction costs between parties. They then develop a broader theory of the demand and supply of insurance that introduces other factors not usually considered, including information imperfections, effort and attention costs, multiattribute preferences, and insolvency concerns. They conclude that there may be a role in which

government can increase economic welfare in some of these situations.

Brown, Mitchell, and Poterba explore four issues concerning annuitization options that retirees might use in the decumulation phase of an "individual accounts" retirement saving system. First, they investigate the operation of both real and nominal individual annuity markets in the United Kingdom. The widespread availability of real annuities in the United Kingdom dispels the argument that private insurance markets could not, or would not, provide real annuities to retirees. Second, the authors consider the current structure of two inflation-linked insurance products available in the United States, only one of which proves to be a real annuity. Third, they evaluate the potential of assets, such as stocks, bonds, and bills, to provide retiree protection from inflation. Finally, the authors use a simulation model to assess the potential willingness of retirees to pay for real, nominal, and variable payout equity-linked annuities. They find that a representative retiree with a relative risk aversion coefficient of two would need 1.5 times as much wealth to achieve a given lifetime utility level without access to an actuarially fair nominal annuity market as someone with such a market. These findings are germane to concerns raised in connection with Social Security reform plans that include individual accounts.

Moss presented a draft chapter on Social Security from his book in progress (tentatively titled *When All Else Fails*) about the government's role as a risk manager. In this chapter, he explores the pivotal risk management logic underlying Franklin D. Roosevelt's landmark social insurance legislation of 1935, which inaugurated the nation's federal-state system of unemployment insurance as well as its purely federal old-age insurance program. Moss finds that although risk management was only

one of several explicit goals motivating the enactment of federal old-age insurance (the others being economic stabilization, redistribution, and forced savings), it was nonetheless a very important one. Depression-era policymakers focused on three risks that they believed plagued millions of Americans in their efforts to save for retirement—longevity risk, work-duration risk, and investment risk. The last of these was viewed with particular alarm, since retirees who had depleted their human capital were thought to be unusually vulnerable to financial volatility. Comprehensive risk management thus emerged as one of the primary objectives (perhaps the primary objective) in the formulation of federal old-age insurance—a historical fact that takes on added significance given the current debate over Social Security privatization.

Grace and Phillips investigate the incentives that states have to regulate insurance products in an efficient manner. Regulation of the insurance industry in the United States is unique in that it is conducted primarily at the state level while the majority of insurance sales are interstate. States with small domestic insurance markets are less efficient producers of insurance regulation, and they tend to allow states that expend the greatest resources to regulate for them. Furthermore, states with more profitable domestic insurers export greater levels of regulation, suggesting that extraterritorial regulation may erect barriers to entry. Grace and Phillips find increasing economies of scale in the production of insurance regulation after they control for these regulatory externalities. Taken together, their results suggest that aggregating the production of regulation to a multistate or federal level may resolve a number of inefficiencies in the current system.

Myers and Read show how option pricing methods can be used to

allocate an insurance company's surplus across different lines of insurance. The first step is to calculate a default value, that is the premium that the company would have to pay in a competitive market for a policy guaranteeing payment of all policyholders' losses if the company defaults. Each line's marginal contribution to the default value would be the same. The resulting allocations are unique and not arbitrary. The surplus allocation of a line depends not just on the degree of uncertainty about the line's losses, but also on the correlations with other lines' losses and with the returns on the company's assets. It also depends on the line-by-line composition of the insurance company's business, but adding new lines should not lead to material changes in surplus allocations for existing lines.

Hendel and **Lizzetti** focus on the life insurance industry and ask how contracts are designed to deal with

classification risk. Their model captures the main features of this industry, and the data are especially suited for a test of their theory, since they include information on the entire profile of future premiums. The authors find that the lack of commitment by consumers shapes contracts in the way that their theory predicts. All types of contracts involve front-loading, which generates a partial lock-in of consumers. Contracts that are more front-loaded have a lower present value of premiums over the period of coverage. This is consistent with the idea that more front-loaded contracts retain better risk pools. The estimates suggest that classification risk is insured almost completely by long-term level-premium contracts.

Reinsurance, the traditional hedging instrument for insurers, encounters potentially serious moral hazard, which is reflected in contract design. New financial instruments have adopted radically different devices

for addressing moral hazard, including the use of "instrument variables" that are correlated to the insurer's risk but which the insurer cannot control. **Doherty** and **Smetters** attempt to identify moral hazard in the traditional reinsurance market. They build a multiperiod principal agent model of the reinsurance transaction with which they can predict on premium design, monitoring loss control, and insurer risk retention. Then using panel data on U.S. property liability reinsurance, they find evidence for the use of loss sensitive premiums when the insurer and reinsurer are not affiliates (that is, not part of the same financial group). There is little or no use of monitoring, though. In contrast, when the insurer and reinsurer are affiliates—and where monitoring costs are lower—there is little use of price controls, but Doherty and Smetters find evidence for the use of monitoring.

Development of the American Economy

The NBER's Program on the Development of the American Economy met in Cambridge on March 4. Program Director Claudia Goldin, NBER and Harvard University, chose the following papers for discussion:

Peter L. Rousseau, NBER and Vanderbilt University, "Jacksonian Monetary Policy: Specific Blows and the Panic of 1837" (NBER Working Paper No. 7528).

Antoni Estevadeordal, Inter-

American Development Bank and **Alan M. Taylor**, NBER and University of California, Davis, "Global Factor Trade in Olin's Time."

Douglas A. Irwin, NBER and Dartmouth College, "How Did the United States Become a Net Exporter of Manufactured Goods?"

Gary D. Libecap, NBER and University of Arizona, and **Zeynep K. Hansen**, University of Arizona, "Rum Follows the Plow: The

Climate Information Problem and Homestead Failure in the Upper Great Plains, 1890-1925."

Eric V. Fishback, NBER and University of Arizona, **Michael R. Haines**, NBER and Colgate University, and **Shawn E. Kantor**, NBER and University of Arizona, "The Impact of the New Deal on the Socioeconomic Status of Children: An Analysis of Infant Mortality during the Great Depression."

The Panic of 1837 was among the most severe banking crises in U.S. history, marking the start of a busi-

ness downturn from which the nation did not recover for six years. Because the panic had serious con-

sequences for the rapidly evolving commercial and industrial sectors, economists have attempted to disen-

Orange its "true" causes from a host of aggravating domestic and international shocks. Using previously unexploited information from U.S. government documents and contemporary newspapers, **Rousseau** finds that neither the official distribution of the federal surplus to the states in the spring of 1837 nor an international shock was at the heart of the crisis. Rather, a series of previously overlooked interbank transfers of government balances ordered in the year leading up to the crisis combined with a policy-induced increase in the demand for coin in the western states, drained the largest New York City banks of their specie reserves and rendered the panic inevitable.

An empirical tradition in international trade seeks to establish whether the predictions of the factor abundance theory match current data. Researchers typically have found the measured factor content of trade to

One far smaller than its predicted magnitude in the pure Heckscher-Ohlin-Vanek framework. This is known as the "missing trade mystery." **Estevedordal** and **Taylor** ask if the theory was as at odds with reality at the time of its conception as it is now. They apply contemporary tests to historical data on goods and factor trade from Ohlin's time, focusing on the major trading zone that inspired the factor abundance theory: the "Old World" and "New World" of the pre-1914 "Greater Atlantic" economy. Their analysis is set in a very different context from contemporary studies.

Thus, their work complements tests applied to today's data and informs the search for improved models of trade.

The United States became a net exporter of manufactured goods around 1910, after a dramatic surge in iron and steel exports occurred in the mid-1890s. **Irwin** argues that an abundance of natural resources fueled the expansion of iron and steel exports, in part by enabling a sharp reduction in the price of U.S. exports relative to those of other competitors. The commercial exploitation of the Mesabi iron ore range, for example, reduced domestic ore prices by 60 percent in the mid-1890s and affected U.S. iron and steel export prices in a way that was equivalent to nearly 30 years of industry productivity growth. These results are consistent with other research showing that U.S. manufactured exports were natural resource intensive at this time.

Libecap and **Hansen** examine two major homestead failures on the U.S. agricultural frontier: one in western Kansas in the 1890s and the other in eastern Montana about 25 years later. They focus on the problems of obtaining weather information faced by migrants to the Great Plains between 1880 and 1920. Libecap and Hansen show that there was only primitive knowledge of the climate, no understanding of what triggered droughts, and no long-term precipitation records for most sites in the region. Hence, the homesteaders had neither an analytical framework nor

sufficient data for predicting fluctuations in rainfall. Also, dryfarming, or scientific soil culture as it was labeled by its advocates, appeared after 1900. It outlined methods for storing moisture in the soil, and as such, made understanding the climate of the Great Plains and its fluctuating rainfall seem less critical. Dryfarming was promoted enthusiastically by all sources of information available to homesteaders. But the resulting information led homesteaders to establish farms that were too small, undercapitalized, and insufficiently diversified to withstand the drought.

Fishback, Haines, and Kantor assess the effectiveness of federal New Deal relief programs by examining their impact on infant mortality rates. Using both cross-sectional and difference-equation methods, the authors find that the New Deal had a relatively modest effect on infant mortality during the Great Depression. With the exception of the Federal Emergency Relief Administration's direct relief to unemployables and the Work Projects Administration's building of public works designed to improve public health, the New Deal played a limited role in influencing the socioeconomic status of children. It seems that the reductions in infant mortality that continued through the 1930s can be explained more by the public health programs and sanitation systems that were implemented in the early part of the twentieth century than by New Deal programs.

Health Care

The NBER's Program on Health Care held its spring meeting in Cambridge on March 10. Alan M. Garber, NBER and Stanford University, organized this program.

Frank R. Lichtenberg, NBER and Columbia University, and **Tomas J. Philipson**, NBER and University of Chicago, "Can the Public Sector Fine-tune Private R and D? Theory and Evidence from the Pharmaceutical Industry"

When the government stimulates R and D, it affects not only current innovators but also their future competitors, whose innovations will make current patents obsolete. Using evidence on all innovations made in the U.S. pharmaceutical industry from 1950–93, **Lichtenberg** and **Philipson** demonstrate that the magnitude of the creative destruction of patent-protected profits is significant. They find on average that seven new drugs in the same drug class enter the market before a typical drug's patent expires. Each additional standard-review entrant reduces the sales of the incumbent drug in the same class by about 8 percent. The reduction in the (present discounted) value of the innovator's sales because of the entry of new and similar yet distinct patented products appears to be at least as large as the reduction in sales caused by the entry of generics after a patent has expired. This suggests that creative destruction by new patents is significant and quantitatively important, and limits the innovative returns to a given patent. Hence, the offsetting effects of government R and D policy may be significant.

Deaton presents a model that attempts to integrate the relationship between income and mortality with the relationship between inequality and mortality. He postulates that indi-

Angus S. Deaton, NBER and Princeton University, "Relative Deprivation, Inequality, and Mortality"

Jeffrey Gepert, NBER, **Mark B. McClellan**, NBER and Stanford University, and **Douglas O. Staiger**, NBER and Dartmouth College, "Hospital Quality, Treatment Effects, and Health Outcomes: Analyzing Differences in Medical Practices"

Philip J. Cook and **Michael J. Moore**, NBER and Duke University, "Environmental and Persistence in Youthful Drinking Patterns"

Krista M. Perreira, Duke University, and **Frank A. Sloan**, NBER and Duke University, "Living Healthy and Living Long: Valuing the Nonpecuniary Loss from Disability and Death"

vidual health is affected negatively by relative deprivation within a reference group, defined as the total "weight" of incomes of group members who are better off than the individual. Deaton argues that this model is consistent with what we know about how social status affects health. The theory predicts that within reference groups, which may be as large as whole populations, mortality declines with income, but at a decreasing rate. Whatever the distribution of income, a mean-preserving increase in the spread of incomes raises mortality for everyone. Between reference groups, as between states or countries, mortality is independent of the level of average income, but it depends on income inequality.

Gepert, McClellan, and Staiger devise a method of summarizing between-hospital variation in patterns of medical practice and estimating how these variations are related to patient outcomes. Using this methodology, they analyze the relationship between treatment and mortality among elderly heart attack patients. The authors find that the most important factor associated with lower patient mortality is higher use of aspirin and beta blockers, as well as other drugs shown to reduce heart attack mortality in randomized controlled trials. Significantly lower mor-

tality is also associated with higher use of invasive procedures (for example, angioplasty and bypass). The results are similar when the analysis is based on zipcode-level variation in treatment patterns, which is arguably less biased by differences in patient selection across hospitals. These estimates of treatment effects also are quite similar to McClellan's 1994 results, but are considerably more precise.

Cook and Moore use panel data from the National Longitudinal Survey of Youth to assess the extent to which alcohol control measures influence how much adolescents drink later in life. They confirm that alcohol control measures in the individual's state of residence have a contemporaneous effect on the likelihood of drinking and bingeing. Also, it turns out that the control measures that were in place years earlier, when the individual was only 14, have a discernible effect on current drinking. Finally, Cook and Moore estimate the effect of state per capita consumption of alcohol on drinking and bingeing.

Perreira and Sloan use three approaches to estimate the nonpecuniary cost associated with disability late in life. They also estimate the value of life using a paired risk-dollar comparison. Their data come

From interviews with 548 persons; the respondents reported a median value of life of \$12 million. They said they

would be willing to pay \$0.9 million to avoid disability in late life, or approximately \$60,400 for each year of

disability over age 62. The results stood up to whatever valuation technique was employed.

Productivity

The NBER's Program on Productivity, directed by **Ernst R. Berndt**, NBER and MIT, met in Cambridge on March 17. These papers were discussed:

Dennis J. Fixler, Bureau of Labor Statistics, and **Robert McClelland**, Congressional Budget Office, "Do Prices Change Uniformly Across Regions?"

Discussant: **Melvyn A. Fuss**, NBER and University of Toronto.

Erik Brynjolfsson and **Michael D. Smith**, MIT, "Fricorless Commerce: An Exploratory Analysis of Internet Pricing Behavior."

Discussant: **Steven T. Berry**, NBER and Yale University.

Amy E. Schwartz, New York University, and **Benjamin P. Scafidi**, Georgia State University,

"What's Happened to the Price of College? Quality Adjusted Price Indexes for Higher Education."

Discussant: **Judith K. Hellerstein**, NBER and University of Maryland.

Bruce Grimm and **Robert P. Parker**, Bureau of Economic Analysis, "Software Prices and Real Output: Recent Developments at the Bureau of Economic Analysis."

Discussant: **Robert J. Gordon**, NBER and Northwestern University.

David M. Cutler, NBER and Harvard University, and **Mark B. McClellan**, NBER and Stanford University, "Productivity Change in Cancer Treatment."

Discussant: **Jonathan S. Skinner**, NBER and Dartmouth College.

Alan White, Analysis Group/Economics, "Output Types and the Canadian Consumer Price Index."

Discussant: **Marshall Reinsdorf**, Federal Deposit Insurance Corporation.

Fixler and **McClelland** estimate one-year log price changes for 175 different items and find that, for all goods, growth rates in at least one Primary Sampling Unit (PSU) were significantly different from the average. For most items, at least one region (Northeast, South, West, or Midwest) had a significant influence on price. Fixler and McClelland then ask whether the size of the PSU drives the results; they find that, in almost every case, large "A-class" PSUs collectively have price growth rates significantly different from the mean. Furthermore, inside each region at least one PSU had significantly different growth rates for most goods. Finally, the authors consider the case of ready-to-eat breakfast cereal. Using CPI data, they find that the price

changes for cereal across areas are significantly different from the mean price change. Then they perform the same experiment using CPI data for a major manufacturer of ready-to-eat cereals, and again they find the same result. Looking at the same manufacturer but using weekly scanner data collected in three New York PSUs, Fixler and McClelland find similar results to those from the CPI data for five one-week indexes but not for the weekly indexes.

Brynjolfsson and **Smith** analyze the characteristics of the Internet as a channel for two categories of homogeneous products: books and CDs. Comparing pricing behavior at 41 Internet and conventional retail outlets, the authors find that prices on the Internet are 9 to 16 percent lower

than prices in conventional outlets, depending on whether taxes, shipping, and shopping costs are included in the price. In addition, they find that Internet retailers' price adjustments over time are up to 100 times smaller than conventional retailers' price adjustments, presumably reflecting lower menu costs in Internet channels. Brynjolfsson and Smith also find that levels of price dispersion depend on the measures employed. When they compare the prices posted by different Internet retailers, they find substantial dispersion: Internet retailer prices differ by an average of 33 percent for books and 25 percent for CDs. However, when they weight these prices by proxies for market share, the dispersion is actually lower in Internet channels

than in conventional channels. This reflects the dominance of certain heavily branded retailers. Brynjolfsson and Smith conclude that, while there is less friction in many dimensions of Internet competition, it is branding, awareness, and trust that remain the important sources of heterogeneity among Internet retailers.

According to CPI estimates, the "sticker" or "list" price (tuition and fees) of a college education in the United States has risen significantly faster since the early 1980s than the overall rate of inflation. This has raised considerable concern among policymakers, parents, and students that college attendance is becoming less affordable while it is becoming increasingly important for economic success in the job market. **Schwartz** and **Scafidi** note that the government collects data for the CPI on the list price of college without adjusting for scholarships or other discounts. Further, it makes no adjustments for changes in the quality or characteristics of the services provided, such as attributes of the faculty, the course offerings, or the facilities. Thus, the estimated price indexes reflect changes in quality and characteristics of college as well as changes in price. Using data from the College Board's Annual Survey of Colleges, Schwartz and Scafidi develop a hedonic model of the price of one year at a U.S. four-year college and explore their estimated quality-adjusted price indexes.

One of the most important changes

to the National Income and Product Accounts (NIPAs) in the recently released comprehensive benchmark revision is the recognition of business and government expenditures for computer software as investment. Previously, only software embedded in equipment by the producer of that equipment was counted as investment. Business expenditures for software were classified as inputs to production, and government expenditures for software were classified as government consumption expenditures. In their paper, **Grimm** and **Parker** describe the various types of software; provide an overview of the impacts of the recognition of software as investment in current dollars, prices, real software, and real GDP; discuss the effects of software on the definitions of NIPA components; list changes in NIPA tables attributable to the new treatment of software; and list some planned future improvements. Grimm and Parker describe the methodology they use in an appendix, which expands on the descriptions that appeared in the August and December issues of the *Survey of Current Business*.

Cutler and **McClellan** present some preliminary estimates of a price index for the treatment of breast cancer. Using data from the National Cancer Institute's SEER database linked to Medicare claims data for 1984-91, they show that treatment costs for breast cancer have increased over time, but that longevity has

increased as well. On net, the increase in costs appears to have been worth it; that is, the price index for breast cancer treatment has fallen moderately over time. But these results are sensitive to trends in incidence: the incidence of breast cancer has increased over time. Thus, breast cancer treatment appears to be less successful on a population basis than on a case basis.

White shows that certain CPI basic class indexes averaged higher rates of inflation between 1990 and 1996 than alternate indexes based on a unit value approach or obtained by aggregating outlet-type price indexes. The market entry of discount outlets, with lower prices and apparently lower rates of price increases over time, along with unrepresentative sampling, seems to have contributed to the deviations that White describes. If 30 percent of the CPI basket is prone to such outlet effects, then a plausible estimate of outlet substitution bias for the Canadian CPI is between 0.1 and 0.15 percent per annum (assuming that quality differentials are negligible). Biases arising from an unrepresentative outlet sample range from 0.12 to 0.24 percent per annum for the All-Items CPI. These biases are approximately additive and result in an overall outlet substitution bias and unrepresentative outlet sample bias for the Canadian CPI in the range of 0.2 to 0.4 percent.

International Finance and Macroeconomics

Members and guests of the NBER's Program on International Finance and Macroeconomics met in Cambridge on March 24. Charles M. Engel, NBER and University of Washington, and Andrew K. Rose, NBER and University of California, Berkeley, organized the program and chose the following papers for discussion:

Fernando Alvarez, NBER and University of Chicago; **Andrew Atkeson**, and **Patrick J. Kehoe**, University of Minnesota, "Volatile Exchange Rates and the Forward Premium Anomaly: A Segmented Asset Market View"; Discussants: **Bernard Dumas**, NBER and INSEAD, and **Bibiana J. Jermann**, NBER and University of Pennsylvania.

Giancarlo Corsetti and **Stephen Morris**, Yale University, and **Hyun Song Shin**, Oxford University, "Does One Soros Make a Difference? A Theory of Currency Crises with Large and Small Traders"; Discussants: **Andrés Velasco**, NBER and New York University, and **Shang-Jin Wei**, NBER and World Bank.

Cédric Tille, Federal Reserve Bank of New York, "Beggar Thy Neighbor or Beggar Thyself? The Income Effect of Exchange Rate Fluctuations"; Discussants: **Kenneth S. Rogoff**, NBER and Harvard University, and **Marianne Baxter**, NBER and University of Virginia.

Michael W. Klein, NBER and Tufts University, and **Giovanni Olivei**, Federal Reserve Bank of Boston, "Capital Account Liberalization, Financial Depth, and Economic Growth" (NBER Working Paper No. 7384).

Discussants: **Ross Levine**, University of Minnesota, and **Menzie D. Chin**, NBER and University of California, Santa Cruz.

Andrew K. Rose, "One Money, One Market: Estimating the Effect of Common Currencies on Trade" (NBER Working Paper No. 7432). Discussants: **Jeffrey A. Frankel**, NBER and Harvard University, and **Richard Portes**, NBER and University of California, Berkeley.

Alvarez, Atkeson, and Kehoe analyze the effects of open market operations on interest rates and exchange rates in a model in which agents must pay a Baumol-Tobin style fixed cost to exchange bonds and money. Asset markets are endogenously segmented because this fixed cost leads agents to trade bonds and money only infrequently. Money injections fall disproportionately on the fraction of agents that are currently trading, and hence, they affect real interest rates and real exchange rates. The authors show that the model can generate the observed negative relation between expected inflation and real interest rates. With moderate amounts of segmentation, it generates persistent liquidity effects and volatile and persistent exchange rates.

Corsetti, Morris, and Shin build a model of currency crises in which a single large investor and a continuum of small investors, based on their private information about fundamentals, decide simultaneously whether to attack a currency. In the unique equilibrium of this trading game, the pres-

ence of the large investor makes all other traders more aggressive in their selling. Relative to the case of no large investors, small investors will attack the currency when fundamentals are stronger. Yet, the difference can be small or zero, depending on the relative precision of the private information held by the small and large investors.

Building on the work of Betts and Devereux (2000), **Tille** analyzes the impact of monetary shocks in an open economy. When exchange rate fluctuations are not entirely passed through to consumer prices, an exchange rate depreciation does not necessarily have a beggar-thy-neighbor effect, and in fact may have an opposite beggar-thyself effect. The direction of the welfare effect depends on who owns the firms that import goods and sell them to consumers, a dimension not explored in the earlier literature.

Klein and **Olivei** show that open capital accounts have a statistically significant and economically relevant effect on financial depth and economic growth in a cross-section of

countries over the period 1986–95. However, these results are driven largely by the developed countries in the sample. The observed failure of capital account liberalization to promote financial deepening among developing countries suggests that opening up the capital account has important policy implications.

Rose uses a gravity model and a panel dataset that includes bilateral observations spanning the period from 1970–90 for 186 countries to assess the separate effects of exchange rate volatility and currency unions on international trade. He finds that currency unions have a large positive effect on international trade, and that exchange rate volatility has a small negative effect, even after controlling for a host of other features. These effects are statistically significant and imply that two countries that share the same currency trade three times as much as they would if they had different currencies. Thus, currency unions like the EMU may lead to a large increase in international trade, with all that entails.

International Trade and Investment

The NBER's Program on International Trade and Investment held its Spring meeting in Cambridge on March 31. Program Director Robert C. Feenstra, NBER and University of California, Davis, chose these papers for discussion.

James Harrigan, NBER and Federal Reserve Bank of New York and **Egon Zakrajsek**, Federal

Reserve Board of Governors, "Factor Supplies and Specialization in the World Economy."

Donald R. Davis and **David E. Weinstein**, NBER and Columbia University, "Trade in a Nonintegrated World: Insights from a Factor Content Study."

Andrew B. Bernard, NBER and Dartmouth College, and

J. Bradford Jensen, Bureau of the Census, "International Trade and Plant Closures."

Bruce Blonigen, NBER and University of Oregon, "Tariff-Jumping: Antidumping Duties."

Joshua Aizenman, NBER and Dartmouth College, "Capital Controls and Financial Crises" (NBER Working Paper No. 7398).

Harrigan and **Zakrajsek** study the relationship between specialization and relative factor supplies. Using a panel of 23 countries over 23 years, they show that factor endowments do help to predict specialization, particularly in large industrial sectors which are not natural-resource based. Their conclusion is that relative factor endowments have a large influence on specialization. However, there is still a great degree of country-specific idiosyncrasy in specialization patterns. A fuller account of specialization probably will include roles for history, geography, technology, and economic policy—but such an account definitely will include a role for relative factor supplies.

Using actual technology matrices, **Davis** and **Weinstein** show that true net factor service trade of wealthy countries typically is not zero but rather is 10 to 12 percent of national endowments; between 38 and 49 percent of these countries' endowments are devoted to tradables. Moreover, the authors demonstrate that for half of the countries in their sample, intra-industry trade is actually a more important conduit for net factor service trade than inter-industry trade. Finally, Davis and Weinstein show that endowments are an important determinant of bilateral trade, even among wealthy countries. Taken together, these results undermine the notion that North-North trade is largely

devoid of factor content and that the prevalence of intra-industry trade is a puzzle for models of comparative advantage.

Bernard and **Jensen** examine the role of international trade and exchange rates in the shutdown of manufacturing plants. Using 20 years of data on the entire U.S. manufacturing sector, they show that the least efficient, least capital-intensive, least skill-intensive plants are the most likely to close down. Increases in regional capital and skill intensity also are associated with higher probabilities of shutdown, especially for plants with low initial capital and skill intensities. Exporting plants are less likely to close, but plants owned by U.S. multinationals are more likely to shut down. Large exchange rate appreciations also increase the probability of plant failure, especially for plants owned by U.S. multinationals.

Blonigen examines the tariff-jumping response of all firm and product combinations subject to U.S. antidumping investigations from 1980–90. He shows that tariff-jumping is realistic only for multinational firms from industrialized countries. Because this excludes so many firms, tariff-jumping of U.S. antidumping protection is relatively modest. This may explain why developing countries have shown more concern over addressing antidumping protection in the World Trade Organization than industrialized countries have. The

raw numbers show a high tariff-response rate for Japanese firms, but this is almost solely because these firms have substantial multinational experience, not because of any Japanese-specific response *per se*.

Aizenman attempts to explain the reluctance of developing countries to open up their capital markets to foreigners and the conditions inducing an emerging market economy to switch its policies. In an economy initially characterized by a one-sided openness to the capital market, domestic agents can borrow internationally, but foreign agents cannot hold domestic equity. Emerging markets capitalists would oppose financial reform, for example, if "green-field" investment by multinationals would bid up real wages, thereby reducing the rents of domestic capitalists. A financial crisis that raises the domestic interest rate and causes a real exchange rate depreciation may induce these emerging markets capitalists to support opening up the economy to foreign direct investment (FDI). This switch in attitude is more likely to occur with a larger debt overhang, lower borrowing constraints, and weaker market power among foreign entrepreneurs. Even in these circumstances, though, the emerging markets capitalists would prefer a partial reform to a comprehensive one: they would prefer to maintain the restrictions on green-field FDI.

Program Meeting on Children

The NBER's Program on Children held its Spring meeting in Cambridge on April 6. Program Director Jonathan Gruber of MIT chose these papers for discussion:

Bruce L. Sacerdote, NBER and Dartmouth College, "Peer Effects with Random Assignment: Results for Dartmouth Roommates" (NBER Working Paper No. 7469)

David T. Ellwood and **Jeffrey B. Liebman**, NBER and Harvard University, "The Middle-Class Parent

Penalty: Child Benefits in the U.S. Tax Code"

Anne C. Case, NBER and Princeton University, **Tzen Lin** and **Sarah S. McLanahan**, Princeton University, "How Hungry Is the Selfish Gene?" (NBER Working Paper No. 7401)

David N. Figlio, NBER and University of Florida, and **Jens O. Ludwig**, Georgetown University, "Sex, Drugs, and Catholic Schools: Private Schooling and Nonmarket Adolescent Behaviors"

Peter F. Todd, NBER and University of Pennsylvania, and **Jere R. Behrman** and **Yingmei Cheng**, University of Pennsylvania, "Evaluating Preschool Programs: When Length of Exposure to the Program Matters: A Nonparametric Approach"

Esther Duflo, NBER and MIT, "Grandmothers and Granddaughters: The Effects of Old-Age Pension on Child Health in South Africa"

Sacerdote measures peer effects among college-age roommates. He finds that among Dartmouth College freshmen roommates and dorm-mates, who are randomly assigned, peer effects help to determine levels of academic effort and such social decisions as whether to join a fraternity. In other major life decisions, such as the choice of college major, residential peer effects are markedly absent. Peer effects on GPA occur at the individual room level, whereas peer effects on fraternity membership occur at both the room and dorm level, Sacerdote finds. Also, freshmen with high social ability are likely to remain with their roommates in their sophomore year, but freshmen with high academic ability are less likely to keep their roommates.

Middle-class parents, who earn too much to qualify for the Earned Income Tax Credit but too little to gain much benefit from tax deductions, might be said to face a kind of middle-class-parent penalty relative to their poorer and richer counterparts. This middle-class-parent penalty not only raises issues of fairness, it also generates marginal tax rates and marriage penalties for moderate-income families that are as high or higher than those facing wealthier taxpayers. **Ellwood** and **Liebman**

document how the tax benefits from children vary with income, and they illustrate the impact of those benefits on marginal tax rates and marriage penalties. They then examine five proposals for reducing or eliminating the middle-class-parent penalty and the high marginal tax rates and marriage penalties it produces.

Case, Lin, and McLanahan examine resource allocation in step households in the United States and South Africa to test whether investments in children vary according to economic and genetic bonds between parent and child. Using 18 years of data on food expenditure by family type, holding constant household size, age composition, and income, the authors find that in those households in which a child is raised by an adoptive, step, or foster mother, less is spent on food. In South Africa, when a child's biological mother is the head or spouse of the head of household, the household spends significantly more on food, in particular on milk, fruit, and vegetables, and significantly less on tobacco and alcohol. The genetic tie to the child, and not any anticipated future economic tie, appears to be the tie that binds.

Figlio and **Ludwig** examine the effects of private schooling on adolescent drug use, sexual activity, fer-

tility, and arrests. They exploit the variation across metropolitan areas in the costs that parents face in transporting their children to private schools, stemming from differences in the quality of the local transportation infrastructure (such as availability of public transportation and roadway congestion), the geographic concentration of private schools throughout the metropolitan area, and whether the state government subsidizes private-school transportation. The authors find that most of the differences in nonmarket adolescent behaviors between religious private, nonreligious private, and public schools can be accounted for by differences in student and family characteristics. However, religious private schools do appear to reduce teen sexual activity; still, an accompanying reduction in the use of birth control leads to a net increase in the unconditional probability of teen fecundity.

Todd, Behrman, and Cheng evaluate the effects of a preschool enrichment program in a developing country on cognitive, psychosocial, and anthropometric outcomes. These outcomes are all highly dependent on age and duration of exposure to the program. The authors' estimates are based on three comparison groups:

children in the communities in which the program was introduced who were not in the program; children in similar communities in which the program had not yet been introduced; and children who were in the program for a month or less. The preschool program increases cognitive and psychosocial test scores, but only for children who participated in the program for at least seven months, they find. The anthropometric results for weight differ substantially depending on which comparison group is used, though. The authors' preferred estimates based on

the third comparison group indicate that the program tends to improve the anthropometric outcomes, with initially increasing effects as the duration of participation in the program increases. Cost-benefit analysis based on these estimates and other assumptions indicate fairly high rates of return for this program.

Duflo studies the impact of a cash transfer program on child health in South Africa. In the early 1990s, the benefits and coverage of the South African social pension program were expanded for the black population. This reform provides a unique op-

portunity for estimating the impact of an increase in cash transfers on child health, as well as the differences in impact attributable to the gender of the transfer recipient. About one-third of black South African children under age five live with an elderly person. Estimates in this study suggest that pensions received by the maternal grandmother have a large impact on the anthropometric status of children, girls in particular. Duflo finds no similar effect when a man is the pension recipient, or when it is received by the paternal grandmother.

Labor Studies

The NBER's Program on Labor Studies met in Cambridge on April 7. Program Director Richard B. Freeman and Lawrence Katz, both of NBER and Harvard University, organized the following agenda:

Francine D. Blau, NBER and Cornell University, and **Lawrence M. Kahn**, Cornell University

Do Cognitive Test Scores Explain Higher U.S. Wage Inequality?

Kevin M. Murphy and **Robert H. Topel**, NBER and University of

Chicago, "The Economic Value of Increased Longevity and Medical Research"

Christopher N. Avery, Harvard University, **Christine M. Jolls** and **Alvin E. Roth**, NBER and Harvard University, and **Richard A. Posner**, University of Chicago, "The Market for Federal Judicial Law Clerks"

Canice Prendergast, NBER and University of Chicago, "The Firms' Tradeoff of Risk and Incentives"

Sandra E. Black, Federal Reserve Bank of New York, and **Lisa M. Lynch**, NBER and Tufts University

"What's Driving the Economy? The Benefits of Workplace Innovation" (NBER Working Paper No. 7419)

David Neumark, NBER and Michigan State University, and

Scott J. Adams, Michigan State University, "Do Living Wage Ordinances Reduce Urban Poverty?"

Using microdata from the 1994-5 International Adult Literacy Survey, **Blau** and **Kahn** examine the role of cognitive ability in explaining higher wage inequality in the United States than in other countries. They find that the greater dispersion of cognitive test scores in the United States does play a part in explaining higher U.S. wage inequality, but that higher labor market "prices" (that is, returns to measured human capital and cognitive performance) and residual

inequality also are important for both men and women. Blau and Kahn find that, on average, "prices" are quantitatively much more important than differences in the distribution of test scores. Internationally, collective bargaining coverage turns out to be significantly and negatively related to wage differentials and significantly and positively related to employment differentials across skill groups. This suggests that unions lower wage differentials, causing a reduction in em-

ployment among the group whose wages are raised the most. The authors also find that a group's net labor supply (supply minus demand) is significantly negatively related to its relative wage but is not related to its relative employment level. Blau and Kahn conclude that both institutions and market forces affect labor market outcomes.

Murphy and **Topel** develop an economic framework for evaluating the social benefits of medical re-

Search. They begin with a model of the economic value of health and life expectancy, which they apply to U.S. data on overall and disease-specific mortality rates. They find that the historical gains from increased longevity have been enormous, on the order of \$2.8 trillion annually from 1970–90. The reduction in mortality from heart disease alone has increased the value of life by about \$1.5 trillion per year over the 1970–90 period. The potential gains from future innovations in health care are also extremely large. Eliminating deaths from heart disease would generate approximately \$48 trillion in economic value, while a cure for cancer would be worth \$47 trillion. Even a modest 1 percent reduction in cancer mortality would be worth about \$500 billion. Unless costs of treatment rise dramatically with the application of new medical knowledge, these estimates indicate that the social returns to investment in new medical knowledge are enormous.

In September 1998, the Judicial Conference of the United States abandoned its latest attempt to regulate the timing of interviews and offers in the law clerk selection process. **Avery, Jolls, Posner, and Roth** empirically survey the further unraveling of the market since then, make comparisons with other entry-level professional labor markets, and evaluate some possibilities for reform.

Prendergast provides three simple reasons why there might not be a tradeoff of risk and incentives, and

why incentives are more likely to be found in situations with considerable uncertainty. First, he shows that the effectiveness of input monitoring is lower in risky settings, so output-based pay may be the only way to induce appropriate efforts in uncertain situations. Second, firms use performance appraisals for reasons other than rewarding agents. Specifically, firms using subjective evaluation procedures worry about a tradeoff between incentives and worker selection in a way that results in higher incentives in noisier environments. Third, monitoring is often triggered by endogenous events, such as an impression of poor performance, and is less effective in noisy environments. To compensate for this reduced role for monitoring in uncertain environments, incentives are increased.

Using a unique nationally representative sample of U.S. establishments surveyed in 1993 and 1996, **Black and Lynch** examine the relationship between workplace innovations and establishment productivity and wages. They match plant-level practices with plant-level productivity and wage outcomes and find a positive and significant relationship between the proportion of nonmanagers using computers and the productivity of establishments. They also find that firms that re-engineer their workplaces to incorporate more high performance practices experience higher productivity and higher

wages. Profit sharing and stock options also are associated with increased productivity. However, increasing the use of profit sharing or stock options results in lower regular pay for workers, especially for technical workers and clerical/sales workers. Finally, increasing the percentage of workers meeting regularly in groups has a larger positive effect on both productivity and wages in unionized establishments.

Many cities in the United States recently have passed living wage ordinances. These ordinances typically mandate that businesses under contract with the city, or in some cases receiving assistance from the city, must pay their workers a sufficient wage to financially support a family. **Neumark and Adams** estimate the effects of these living wage ordinances on the wages and hours of workers in cities that have adopted such legislation. They also look at the effects of the ordinances on employment and poverty rates in these cities. They find that living wage ordinances boost the wages of low-wage workers. In addition, Neumark and Adams find that living wage ordinances have a weak negative effect on hours of low-wage workers and a strong negative effect on employment. Finally, they estimate that living wage ordinances may help to achieve modest reductions in urban poverty.

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Tax Policy and the Economy, Volume 14

Tax Policy and the Economy, Volume 14, edited by James M. Poterba, Director of the NBER's Program on Public Economics and professor of economics at MIT, will be available from the MIT Press this spring. This series of annual volumes presents recent research on the effects of taxation and government expenditure programs on economic performance. The topics covered in this volume include: the taxation of executive compensation; internet commerce, tax sensitivity, and the generation gap; stock market reaction to capital gains tax changes; estate taxes and the timing of parental giving; the fiscal effects of U.S. immigration; and the consequences of welfare aid to children with working families.

This volume should be accessible to tax practitioners and policymakers as well as to academic economists. It is priced at \$40.00 for the clothbound and \$20.00 for the paperback edition and may be ordered directly from the MIT Press.

NBER Macroeconomics Annual 1999

NBER Macroeconomics Annual 1999, edited by Ben S. Bernanke and Julio Rotemberg, is also available from the MIT Press this spring. The goals of this annual conference are to present, extend, and apply frontier work in macroeconomics and to stimulate work by macroeconomists on policy issues. The topics covered in the 1999 conference volume are: liquidity crises in emerging markets; the IMF approach to economic stabilization; the Japanese banking crisis; stock prices and fundamentals; labor market policies in an equilibrium search model; and, two decades of decline in the U.S. saving rate.

Both editors are NBER Research Associates in the Programs on Economic Fluctuations and Growth and Monetary Economics. Bernanke is also professor of economics and public affairs at Princeton University. Rotemberg is professor of business administration at the Harvard Business School.

The volume is priced at \$50.00 for the clothbound and \$25.00 for the paperback edition, and may be ordered directly from the MIT Press.

These volumes may be ordered directly from the University of Chicago Press, Order Department, 11030 South Langley Avenue, Chicago, IL 60628-2215, 1-800-621-2736. Academic discounts of 10 percent for individual volumes and 20 percent for standing orders for all NBER books published by the University of Chicago Press are available to university faculty; orders must be sent on university stationery.

The Changing Hospital Industry: Comparing Not-for-Profit and For-Profit Institutions

The Changing Hospital Industry: Comparing Not-for-Profit and For-Profit Institutions, edited by David M. Cutler, is now available from the University of Chicago Press for \$53.00. The papers in this volume

Oask: what determines a hospital's choice of for-profit versus non-profit organization? And, how does that organizational form affect patients and society as a whole?

This volume should interest students of health economics, public finance, hospital management, and health services, but is also relevant to policymakers and to concerned individuals.

Cutler is an NBER Research Associate and an associate professor of economics at Harvard University.

A Prelude to the Welfare State: The Origins of Workers' Compensation

A Prelude to the Welfare State: The Origins of Workers' Compensation, edited by Price V. Fishback and Shawn Everett Kantor, is now available from the University of Chicago Press for \$37.50 (clothbound).

Fishback and Kantor challenge widespread historical perceptions, arguing that, rather than being an early progressive victory, workers' compensation succeeded because all relevant parties—labor and management, insurance companies, lawyers, and legislators—benefited from the legislation. Their work, one in a series of NBER volumes on Long-Term Factors in Economic Development, is a major reappraisal of the causes and consequences of a movement that changed the nature of social insurance and the American workplace. It should interest labor leaders, policymakers, and students of economic history.

Both Fishback and Kantor are NBER Research Associates in the Program on the Development of the American Economy. Fishback is also professor of economics at the University of Arizona. Kantor is a professor of economics and public administration and policy at the same institution.

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